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Coal Combustion Waste Impoundment

Round 7 - Dam Assessment Report

Louisa Generating Station (Site 16)

Bottom Ash Pond
MidAmerican Energy Company
Muscatine, Iowa

Prepared for:

United States Environmental Protection Agency
Office of Resource Conservation and Recovery

Prepared by:

Dewberry & Davis, LLC
Fairfax, Virginia

Under Contract Number: EP-09W001727
October 2010

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INTRODUCTION, SUMMARY CONCLUSIONS AND RECOMMENDATIONS

The release of over five million cubic yards from the Tennessee Valley Authority's Kingston, Tennessee facility in December 2008, which flooded more than 300 acres of land, damaging homes and property, is a wake-up call for diligence on coal combustion waste disposal units. We must marshal our best efforts to prevent such catastrophic failure and damage. A first step toward this goal is to assess the stability and functionality of the ash impoundments and other units, then quickly take any needed corrective measures.

This assessment of the stability and functionality of the Louisa Generating Station Ash Pond management unit is based on a review of available documents and on the site assessment conducted by Dewberry personnel on Tuesday, September 15, 2010. We found the supporting technical documentation adequate (Section 1.1.3). As detailed in Section 1.2.6, there are maintenance recommendations that may help to maintain a safe and trouble-free operation.

In summary, the Louisa Generating Station Ash Pond management unit is SATISFACTORY for continued safe and reliable operation, with no recognized existing or potential management unity safety deficiencies.

PURPOSE AND SCOPE

The U.S. Environmental Protection Agency (EPA) is embarking on an initiative to investigate the potential for catastrophic failure of Coal Combustion Surface Impoundments (i.e., management unit) from occurring at electric utilities in an effort to protect lives and property from the consequences of a dam failure or the improper release of impounded slurry. The EPA initiative is intended to identify conditions that may adversely affect the structural stability and functionality of a management unit and its appurtenant structures (if present); to note the extent of deterioration (if present), status of maintenance and/or a need for immediate repair; to evaluate conformity with current design and construction practices; and to determine the hazard potential classification for units not currently classified by the management unit owner or by a state or federal agency. The initiative will address management units that are classified as having a Less-than-Low, Low, Significant or High Hazard Potential ranking. (For Classification, see pp. 3-8 of the 2004 Federal Guidelines for Dam Safety)

In February 2009, the EPA sent letters to coal-fired electric utilities seeking information on the safety of surface impoundments and similar facilities that receive liquid-borne material that store or dispose of coal combustion waste. This letter was issued under the authority of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Section 104(e), to assist the Agency in assessing the structural stability and functionality of such

management units, including which facilities should be visited to perform a safety assessment of the berms, dikes, and dams used in the construction of these impoundments.

EPA requested that utility companies identify all management units including surface impoundments or similar diked or bermed management units or management units designated as landfills that receive liquid-borne material used for the storage or disposal of residuals or by-products from the combustion of coal, including, but not limited to, fly ash, bottom ash, boiler slag, or flue gas emission control residuals. Utility companies provided information on the size, design, age and the amount of material placed in the units. The EPA used the information received from the utilities to determine preliminarily which management units had or potentially could have High Hazard Potential ranking.

The purpose of this report is to evaluate the condition and potential of waste release from **management units that have not been rated for hazard potential classification**. This evaluation included a site visit. Prior to conducting the site visit, a two-person team reviewed the information submitted to EPA, reviewed any relevant publicly available information from state or federal agencies regarding the unit hazard potential classification (if any) and accepted information provided via telephone communication with the management unit owner. Also, after the field visit, additional information was received by Dewberry & Davis LLC about the Louisa Bottom Ash Pond Dam that was reviewed and used in preparation of this report.

Factors considered in determining the hazard potential classification of the management units(s) included the age and size of the impoundment, the quantity of coal combustion residuals or by-products that were stored or disposed of in these impoundments, its past operating history, and its geographic location relative to down gradient population centers and/or sensitive environmental systems.

This report presents the opinion of the assessment team as to the potential of catastrophic failure and reports on the condition of the management unit(s).

LIMITATIONS

The assessment of dam safety reported herein is based on field observations and review of readily available information provided by the owner/operator of the subject coal combustion waste management unit(s). Qualified Dewberry engineering personnel performed the field observations and review and made the assessment in conformance with the required scope of work and in accordance with reasonable and acceptable engineering practices. No other warranty, either written or implied, is made with regard to our assessment of dam safety.

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1.0 CONCLUSIONS AND RECOMMENDATIONS

1.1 CONCLUSIONS

Conclusions are based on visual observations from a one-day site visit, Wednesday, September 15, 2010, and review of technical documentation provided by MidAmerican Energy Company (MidAmerican).

1.1.1 Conclusions Regarding the Structural Soundness of the Management Unit(s)

The Bottom Ash Pond appears to be structurally sound based on the slope stability analyses and visual observations.

1.1.2 Conclusions Regarding the Hydrologic/Hydraulic Safety of the Management Unit(s)

Adequate capacity and freeboard exist to safely pass the design storm.

1.1.3 Conclusions Regarding the Adequacy of Supporting Technical Documentation

Supporting technical documentation is adequate.

1.1.4 Conclusions Regarding the Description of the Management Unit(s)

Descriptions provided are appropriate.

1.1.5 Conclusions Regarding the Field Observations

The overall assessment of the Bottom Ash Pond embankment system was that it was in satisfactory condition; however, portions of the downstream/outside slope were found to be overgrown with dense brush and trees.

1.1.6 Conclusions Regarding the Adequacy of Maintenance and Methods of Operation

Maintenance and methods of operation are inadequate for the Bottom Ash Pond; dense brush and trees should not be present along portions of the downstream/outside slopes.

1.1.7 Conclusions Regarding the Adequacy of the Surveillance and Monitoring Program

Existing surveillance and dam monitoring programs are adequate.

1.1.8 Classification Regarding Suitability for Continued Safe and Reliable Operation

The facility is SATISFACTORY for continued safe and reliable operation. No existing or potential management unit safety deficiencies are recognized. Acceptable performance is expected under all applicable loading conditions (static, hydrologic, seismic) in accordance with the applicable criteria.

1.2 RECOMMENDATIONS

1.2.1 Recommendations Regarding the Structural Stability

Slope stability analyses for rapid drawdown conditions and seismic loading conditions should be performed for the Bottom Ash Pond.

1.2.2 Recommendations Regarding the Hydrologic/Hydraulic Safety

None appear warranted at this time.

1.2.3 Recommendations Regarding the Supporting Technical Documentation

Slope stability analyses for rapid drawdown conditions and seismic loading conditions should be performed for the Bottom Ash Pond.

1.2.4 Recommendations Regarding the Description of the Management Unit(s)

None appear warranted at this time.

1.2.5 Recommendations Regarding the Field Observations

None appear warranted for the Bottom Ash Pond.

1.2.6 Recommendations Regarding the Maintenance and Methods of Operation

Dense brush and trees should be removed from portions of the downstream/outside slopes; proper grass ground cover needs to be re-established.

1.2.7 Recommendations Regarding the Surveillance and Monitoring Program

None appear warranted at this time.

1.2.8 Recommendations Regarding Continued Safe and Reliable Operation

None appear warranted at this time.

1.3 PARTICIPANTS AND ACKNOWLEDGEMENT

1.3.1 List of Participants

Joe Bannon, MidAmerican
James Wiegand, MidAmerican
Bill Whitney, MidAmerican
Mike McLaren, Dewberry
Frederic Shmurak, Dewberry

1.3.2 Acknowledgement and Signature

We acknowledge that the management unit referenced herein has been assessed on September 15, 2010.

Michael McLaren, P.E.

Frederic Shmurak, P.E.

2.0 DESCRIPTION OF THE COAL COMBUSTION WASTE MANAGEMENT UNIT(S)

2.1 LOCATION AND GENERAL DESCRIPTION

The Louisa Generating Plant and Bottom Ash Pond are located south of the intersections of US Highway 61 and Zachary Avenue, and north of the west bank of the Mississippi River; the Town of Muscatine Iowa is approximately 10 miles west and downstream of the ash pond dam. Figure 2.1a depicts a vicinity map around the Louisa Generating Plant, while Figure 2.1b depicts an aerial view of the Louisa Generating Plant Facility.

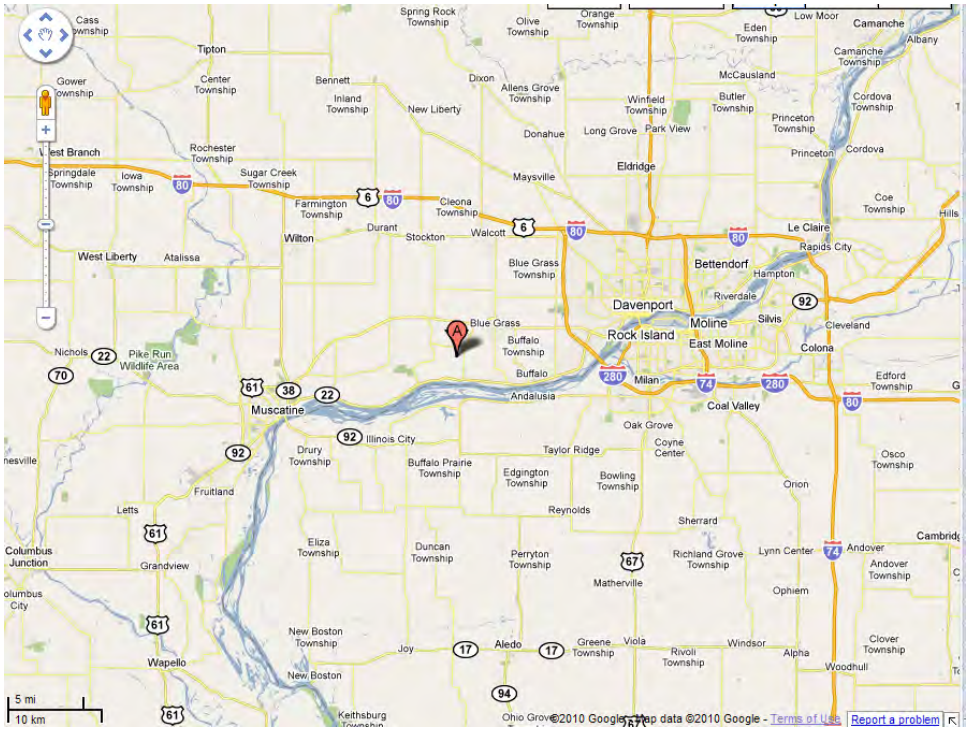


Figure 2.1a: Louisa Generating Plant Location Map.

Figure 2.1b: Louisa Generating Plant Aerial Photograph.

2.2 SIZE AND HAZARD CLASSIFICATION

The Bottom Ash Pond is impounded by an earthen embankment system consisting of a combination of an incised and diked configuration. Based on data provided by MidAmerican Energy Company (MEC), the Bottom Ash Pond embankment system is constructed to a maximum height of 26 feet (see Table 2.1a for dimensions and size data). Side slopes for the Bottom Ash Pond 3(H):1(V); crest width is approximately 12 feet. The maximum storage volume corresponding to the top of the embankment is 242 acre-feet. The classification for size, based on the height of the dam and storage capacity, is Small in accordance with the USACE Recommended Guidelines for Safety Inspection of Dams ER 1110-2-106 criteria (see Table 2.2a for size classification criteria).

Table 2.1: Summary of Dam Dimensions and Size	
	South Ash Pond
Dam Height (ft)	26
Crest Width (ft)	12
Length (ft)	2,020
Side Slopes (upstream) H:V	3:1
Side Slopes (downstream) H:V	3:1

Table 2.2a: USACE ER 1110-2-106 Size Classification		
	Impoundment	
Category	**Storage (Ac-ft)**	**Height (ft)**
Small	50 and < 1,000	25 and < 40
Intermediate	1,000 and < 50,000	40 and < 100
Large	> 50,000	> 100

No information on the Hazard Classification was provided, but based on observations; a classification of **Low** appears to be appropriate. Per the Federal Guidelines for Dam Safety dated April 2004, a Low Hazard Potential classification applies to those dams where failure or mis-operation results in no probable loss of human life and low economic and/or environmental losses. Considering the low probability of loss of life should the bottom ash dam system fail, as well as the relatively small impoundment size of the facility, a Federal Hazard Classification of Low appears to be appropriate for this facility (see Table 2.2b for Hazard classification criteria).

Table 2.2b: FEMA Federal Guidelines for Dam Safety Hazard Classification		
	Loss of Human Life	**Economic, Environmental, Lifeline Losses**
Low	None Expected	Low and generally limited to owner property
Significant	None Expected	Yes
High	Probable. One or more expected	Yes (but not necessary for classification)

2.3 AMOUNT AND TYPE OF RESIDUALS CURRENTLY CONTAINED IN THE UNIT(S) AND MAXIMUM CAPACITY

Per MidAmerican, the North Ash Pond contains fly ash (5%), bottom ash and boiler slag (95%), excess stormwater runoff, and process wastewater from the facility. The drainage area is assumed to be the surface area of the pond. The maximum design storage capacity is approximately 390,000 cubic yards.

Table 2.3: Maximum Capacity of Unit	
	Bottom Ash Pond
Surface Area (acre)	42
Total Storage Capacity (acre-feet)	242
Total Storage Capacity (cubic yards)	390,000
Coal Combustion Residue Stored (cubic yards)	195,000
Crest Elevation (feet)	568
Normal Pond Level (feet)	561

2.4 PRINCIPAL PROJECT STRUCTURES

2.4.1 Earth Embankment

MEC personnel provided limited subsurface data consisting of boring logs used in conjunction with monitoring well installations. Based on the boring logs, it appears the Bottom Ash Pond consists of stratums of loose and firm sands.

2.4.2 Outlet Structures

The Bottom Ash Pond does not contain an outlet system; however, the facility does contain a 6” diameter welded steel pressure pipe system that maintains normal pool using a pump system, and discharges into a small channel and directly into the Mississippi River.

2.5 CRITICAL INFRASTRUCTURE WITHIN FIVE MILES DOWN GRADIENT

All critical infrastructures were located using aerial photography and might not accurately represent what currently exists down-gradient of the site. Not all critical infrastructures are labeled for clarity purposes. Figure 2.1b shows the Louisa Generating Plant and associated critical infrastructure listed in Table 2.5.

Table 2.5 Critical Infrastructure within 5 Miles Down gradient of Facility

Schools	**Nursing Homes**
None Identified	None Identified
Miscellaneous	**Transportation**
Restaurant Places of Worship	Highway 92 Highway 22
Business Residences Cemeteries	**Fire Stations** None Identified

3.0 SUMMARY OF RELEVANT REPORTS, PERMITS, AND INCIDENTS

No reports on the safety of the management units were provided.

3.1 SUMMARY OF LOCAL, STATE, AND FEDERAL ENVIRONMENTAL PERMITS.

The Bottom Ash Pond facility is under regulation by the Iowa Department of Natural Resources. The discharges of the Ash Pond are permitted under the Federal National Pollutant Discharge Elimination Program (Permit # IA0063282).

3.2 SUMMARY OF SPILL/RELEASE INCIDENTS

No spills or releases from the Ash Pond facilities have been noted by MEC for this site.

4.0 SUMMARY OF HISTORY OF CONSTRUCTION AND OPERATION

4.1 SUMMARY OF CONSTRUCTION HISTORY

4.1.1 Original Construction

Original construction of the ash pond facility appears to be circa 1980 based on Sitework – Block 6 Area Finish Grading and Paving Plan drawing prepared by Iowa-Illinois Gas and Electric Company dated 22 May 1980.

4.1.2 Significant Changes/Modifications in Design since Original Construction

No significant changes have been made to the Bottom Ash Pond.

4.1.3 Significant Repairs/Rehabilitation since Original Construction

No significant repairs/rehabilitation information was provided.

4.2 SUMMARY OF OPERATIONAL PROCEDURES

4.2.1 Original Operational Procedures

The Bottom Ash pond was designed and operated for reservoir sedimentation and sediment storage of bottom ash. Plant process waste water, coal combustion waste, and minimal stormwater runoff around the Ash Pond facility are discharged into the reservoir. Inflow water is treated through gravity settling and deposition, and the treated process water and stormwater runoff is pumped to the Mississippi River.

4.2.2 Significant Changes in Operational Procedures and Original Startup

No documentation was provided describing any significant changes in Operating Procedures for the Bottom Ash Pond.

4.2.3 Current Operational Procedures

Original operational procedures are in effect according to utility staff.

4.2.4 Other Notable Events since Original Startup

No additional information was provided.

5.0 FIELD OBSERVATIONS

5.1 PROJECT OVERVIEW AND SIGNIFICANT FINDINGS

Dewberry personnel Michael McLaren, P.E. and Frederic Shmurak, P.E. performed a site visit on 15 September 2010 in company with the participants.

The site visit began at 10:00 AM. The weather was overcast and warm. Photographs were taken of conditions observed. Please refer to photographs in Appendix B and the Dam Inspection Checklist in Appendix C. Selected photographs are included here for ease of visual reference. All pictures were taken by Dewberry personnel during the site visit.

The overall visual assessment of the Bottom Ash Pond embankment system was that it was in satisfactory condition and the only significant finding was trees and shrubs along portions of the downstream/outside slopes of the embankment.

5.2 NORTH ASH POND

5.2.1 Crest

The crest had no signs of any rutting, depressions, tension cracks or other indications of settlement or shear failure, and appeared to be in satisfactory condition (see Figure 5.2.1 below).

Figure 5.2.1: Crest of Bottom Ash Pond dike.

5.2.2 Upstream/Inside Slope

The upstream slope of the embankment is mostly lined with rip rap and stone. Scarps, sloughs, depressions, bulging or other indications of slope instability or signs of erosion were not observed (see Figure 5.2.2).

Figure 5.2.2: Crest and Upstream/Inside Slope of North Ash Pond dike.

5.2.3 Downstream/Outside Slope and Toe

The downstream/outside slope and toe of the Bottom Ash are mostly grass covered with dense brush and trees covering portions of the northern embankment. Scarps, sloughs, depressions, bulging or other indications of slope instability or signs of erosion were not observed (see Figures 5.2.3a and 5.2.3b).

Figure 5.2.3a: Downstream/Outside Slope of Bottom Ash Pond dike.

Figure 5.2.3b: Downstream/Outside Slope of Northern Portion of Embankment.

5.2.4 Abutments and Groin Areas

The embankment consists of a raised dike system; therefore the earthen embankment does not abut existing hillsides, rock outcrops or other raised topographic features.

5.3 OUTLET STRUCTURES

5.3.1 Overflow Structure

The Bottom Ash Pond does not contain an overflow structure; however, the facility does contain a 6” diameter welded steel pressure pipe system that maintains normal pool using a pump system (Figure 5.4.1), and discharges into a small channel and directly into the Mississippi River.

Figure 5.4.1: Pump-house serving Bottom Ash Pond.

5.3.2 Outlet Conduit

The Bottom Ash Pond uses a 6” diameter welded steel pressure pipe system that maintains normal pool using a pump system, and discharges into a small channel and directly into the Mississippi River.

5.3.3 Emergency Spillway

No emergency spillway system is present at either the Bottom Ash Pond.

5.3.4 Low Level Outlet

No low level outlet system is present at Bottom Ash Pond.

6.0 HYDROLOGIC/HYDRAULIC SAFETY

6.1 SUPPORTING TECHNICAL DOCUMENTATION

6.1.1 Flood of Record

No information was provided. The Bottom Ash Pond is a mostly diked embankment facility having a contributing drainage area equal to the surface area of the impoundment; therefore the impounded pool would not be anticipated to experience significant flood stages.

6.1.2 Inflow Design Flood

According to FEMA Federal Guidelines for Dam Safety, the current practice in the design of dams is to use the Inflow Design Flood (IDF) that is deemed appropriate for the hazard potential of the dam and reservoir, and to design spillways and outlet works that are capable of safely accommodating the floodflow without risking the loss of the dam or endangering areas downstream from the dam to flows greater than the inflow. The recommended IDF or spillway design flood for a low hazard small sized structure (See section 2.2), in accordance with the USACE Recommended Guidelines for Safety Inspection of Dams ER 1110-2-106 criteria is the 50- to 100-yr frequency (See Table 6.1.2).

TABLE 6.1.2: USACE HYDROLOGIC EVALUATION GUIDELINES RECOMMENDED SPILLWAY DESIGN FLOODS

HAZARD	SIZE	SPILLWAY DESIGN FLOOD
LOW	SMALL	50- TO 100-YR FREQUENCY
	INTERMEDIATE	100-YR TO ½ PMF
	LARGE	½ PMF TO PMF
SIGNIFICANT	SMALL	100-YR TO ½ PMF
	INTERMEDIATE	½ PMF TO PMF
	LARGE	PMF
HIGH	SMALL	½ PMF TO PMF
	INTERMEDIATE	PMF
	LARGE	PMF

The Probable Maximum Precipitation (PMP) is defined by the American Meteorological Society as the theoretically greatest depth of precipitation for a given duration that is physically possible over a particular drainage area at a certain time of year. The National Weather Service (NWS) further states that in consideration of our limited knowledge of the complicated processes and interrelationships in storms, PMP values are identified as estimates. The NWS has published application procedures that can be used with PMP estimates to develop spatial and temporal characteristics of a Probable Maximum Storm (PMS). A PMS thus developed can be used with a precipitation-runoff simulation model to calculate a probable maximum flood (PMF) hydrograph.

The 50-year frequency 24-hour rainfall is 5.7-inches and the 100-year frequency, 24 hour rainfall is 6.5 inches. The 6-hour, 10-square mile PMP depth is approximately 26 inches. In order to store and pass the PMP, approximately 2' of freeboard must be present. It is reported that the freeboard for the Bottom Ash Pond is about 7 ft; therefore, adequate freeboard appears to exist to safely store and pass the full PMP.

6.1.3 Spillway Rating

No spillway rating was provided. The Bottom Ash pond is mostly a diked embankment facility having contributing drainage areas equal to the surface area of the impoundment; therefore the impounded pool would not be anticipated to experience significant changes in elevation. The Bottom Ash Pond does not contain an outlet system. A pump system and 6" diameter force main regulate the normal pool. Given little change in the normal pool elevation, the resulting discharge rate is expected to be relatively constant.

6.1.4 Downstream Flood Analysis

No downstream flood analysis was provided.

6.2 ADEQUACY OF SUPPORTING TECHNICAL DOCUMENTATION

Supporting technical documentation is sufficient.

6.3 ASSESSMENT OF HYDROLOGIC/HYDRAULIC SAFETY

Adequate capacity and freeboard exists to safely pass the design storm.

7.0 STRUCTURAL STABILITY

7.1 SUPPORTING TECHNICAL DOCUMENTATION

7.1.1 Stability Analyses and Load Cases Analyzed

MEC provided structural stability analyses in the Geotechnical Engineering Report, Preliminary Opinions of Global Stability Ash Containment Pond Embankments, Louisa Generating Station, Louisa County, Iowa dated October 15, 2010. This report documented analyses of slope stability of the levees surrounding the ash pond; specifically under steady state seepage conditions as well as steady state seepage – flood event conditions. According to the report "USGS peak ground acceleration is less than 0.10g for the 100-year earthquake at this site; therefore, seismic loading conditions were not required according the USACE EC 1110-2-6067."

7.1.2 Design Parameters and Dam Materials

Slope stability soil strength parameters appear to be reasonable based on the embankment materials encountered:

Material	Saturated Unit Weight (pcf)	Effective Friction Angle (degrees)	Effective Cohesion (psf)
Embankment Fill Sand	120	28 to 32	0
Native Sand	120	26 to 28	0

7.1.3 Uplift and/or Phreatic Surface Assumptions

Subsurface water levels could not be determined; however they were estimated based on the borings performed for the slope stability analysis:

Boring Number	Observed Water Depth (ft)[1]	
	While Drilling	After Drilling
1	28	NA
2	28	NA
3	28½	NA
4	28	NA
5	28	NA

[1] Below existing grade

7.1.4 Factors of Safety and Base Stresses

The report calculated the following safety factors for the Bottom Ash Pond embankments, and showed that safety factors were equal to or greater than minimum Federal Corps of Engineers safety factors (see Table below).

Table 7.1.4 Estimated Safety Factors from Mid American Study, Louisa Generating Plant

Section[2]	Estimated Factor of Safety Obtained from Analysis[1]				
	Steady State Seepage			Steady State - Flood Event	
	Required Minimum Factor of Safety[3]	Upstream	Downstream	Required Minimum Factor of Safety[3]	Downstream
A	1.4	1.9	1.4	1.4	1.4
C	1.4	2.6	1.7	1.4	1.9
F	1.4	2.1	1.7	-	-

1. Reported factors of safety are for deep seated circular "failure" surfaces that emerge near the levee crest. Computed factors of safety for shallow circular "failure" surfaces near the toe of the levee may be smaller.
2. Refer to Ash Pond Plan in Exhibit D-1, for cross section locations.
3. Reference: Table 6.1b from EM 1110-2-1913

7.1.5 Liquefaction Potential

Liquefaction was not evaluated at the site; however, soil conditions do not appear susceptible to liquefaction.

7.1.6 Critical Geological Conditions

No critical geological conditions appear present at the site. Based on the Geologic Mapping prepared by the Iowa DNR and Iowa Geologic Survey dated October 26, 2009, the Bottom Ash Pond resides within the Devonian System Bedrock Geology. Specifically Dolomite, Limestone, Shale, and Minor Sandstone (Wapsipinicon Group) middle Devonian. This area includes the Otis and Pinicon ridge formations, with a total thickness between 18 and 29m (60-95ft). The Otis Formation is dominated by lithographic to sublithographic, pelletal limestone, with minor dolomite near its base. The Pinicon Ridge Formation is characterized by laminated or brecciated, unfossiliferous limestone and dolomite with minor shale. Adequacy of Supporting Technical Documentation

7.2 ASSESSMENT OF STRUCTURAL STABILITY

Overall, the structural stability of the dam appears to be satisfactory.

7.3 ADEQUACY OF SUPPORTING TECHNICAL DOCUMENTATION

Although supporting technical documentation is adequate to assess the structural stability of the Bottom Ash Pond, slope stability analyses for rapid drawdown conditions and seismic loading conditions should be performed.

7.4 ASSESSMENT OF STRUCTURAL STABILITY

The structural stability of the Bottom Ash Pond appears adequate.

8.0 ADEQUACY OF MAINTENANCE AND METHODS OF OPERATION

8.1 OPERATING PROCEDURES

Operational procedures are adequate. The facility is operated for reservoir sedimentation and sediment storage; specifically, bottom and fly ash residuals. Coal combustion process waste water and stormwater runoff from the facility are discharged into the reservoir, inflow water is treated through gravity settling and deposition, and treated process water and stormwater runoff is pumped into the Mississippi River.

8.2 MAINTENANCE OF THE DAM AND PROJECT FACILITIES

Maintenance procedures need to be improved for the Bottom Ash Pond. Maintenance generally is limited to mowing grass when needed; however, thick woody-stem vegetation, dense brush and trees have been allowed to become established along sections of the downstream embankment.

8.3 ASSESSMENT OF MAINTENANCE AND METHODS OF OPERATIONS

8.3.1 Adequacy of Operating Procedures

Based on the assessments of this report, operating procedures appear to be adequate.

8.3.2 Adequacy of Maintenance

Based on the assessments of this report, maintenance procedures for the Bottom Ash Pond appear to be inadequate. The Bottom Ash Pond embankment has sections that are overgrown with thick woody-stem vegetation, dense brush and trees.

9.0 ADEQUACY OF SURVEILLANCE AND MONITORING PROGRAM

9.1 SURVEILLANCE PROCEDURES

Monthly Inspections:

Monthly inspection reports were provided by MEC for June 2009 through September 2010. The 2010 Ash Pond Inspection checklist form can be found in Appendix A Doc 03: Smith Report 2010.pdf.

9.2 INSTRUMENTATION MONITORING

No embankment monitoring instrumentation devices (i.e. piezometers) were at the facility during the time of the inspection. Monitoring wells are on site, but are used for water quality purposes only.

9.3 ASSESSMENT OF SURVEILLANCE AND MONITORING PROGRAM

9.3.1 Adequacy of Inspection Program

Based on the data reviewed by Dewberry, including observations during the site visit, the inspection program is adequate.

9.3.2 Adequacy of Instrumentation Monitoring Program

No instrumentation is present at the Bottom Ash Pond.

MidAmerican
ENERGY
OBSESSIVELY, RELENTLESSLY AT YOUR SERVICE.

March 26, 2009

Mr. Richard Kinch
US Environmental Protection Agency
Two Potomac Yard
2733 S. Crystal Dr.
5th Floor; N-5783
Arlington, VA 22202 2733

VIA OVERNIGHT MAIL

Re: Surface Impoundment Section 104(e) Request
Louisa Generating Station, Muscatine, Iowa

Dear Mr. Kinch:

This letter responds to the subject information collection request issued by the United States Environmental Protection Agency (EPA) pursuant to section 104(e) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), 42 U.S.C. 9604(e). MidAmerican Energy Company's Louisa Generating Station received your request on March 13, 2009, and this response has been timely submitted within the required ten (10) business days.

MidAmerican Energy Company (MidAmerican) understands that it is not obligated to provide any information or documents protected from disclosure by either attorney-client privilege or the work product doctrine. MidAmerican notes, objects, and reserves all rights to object in the future to EPA's apparent assumption that the residuals or byproducts from the combustion of coal are potential subjects of liability for reimbursement of costs or response under CERCLA; that they are appropriate subjects of the information requests to which MidAmerican is responding; or that they are "hazardous substances" within the meaning of CERCLA. Further, by responding to EPA's request, MidAmerican does not acknowledge that there is any release or threatened release of a hazardous substance, pollutant, or contaminant. MidAmerican also reserves all rights, including rights to object to the requests, not expressly waived.

MidAmerican further objects to this request because it contains undefined and ambiguous terms such as "surface impoundment", "similar diked or bermed management unit(s)", "landfills", "liquid-borne material", "storage or disposal", "no longer receive", "coal combustion residues", "residuals or byproducts", "residues or by-products", and "free liquids", and because the terms "residuals or byproducts" and "residues or by-products" seem to be used interchangeably without an explanation whether the terms are intended to have the same meaning.

Subject to the objections stated herein, MidAmerican provides the following response.

MidAmerican's Louisa Generating Station (Louisa) has one surface impoundment that receives liquid-borne material for the storage of residuals or by-products from the combustion of coal. The questions enclosed in the information collection request have been copied below (in italics) with responses for the surface impoundment.

1. Relative to the National Inventory of Dams criteria for High, Significant, Low, or Less than Low Hazard Potential, please provide the potential hazard rating for each management unit and indicate who established the rating, what the basis of the rating is, and what federal or state agency regulates the unit(s). If the unit(s) does not have a rating, please note that fact.

To MidAmerican's knowledge, the Louisa surface impoundment has not been rated by a Federal or State regulatory agency relative to the National Inventory of Dams criteria.

2. What year was each management unit commissioned and expanded?

The surface impoundment was placed into service in 1983, and there has been no expansion.

3. What materials are temporarily or permanently contained in the unit? Use the following categories to respond to this question: (1) fly ash; (2) bottom ash: (3) boiler slag; (4) flue gas emission control residuals; (5) other. If the management unit contains more than one type of material, please identify all that apply. Also, if you identify "other," please specify the other types of materials that are temporarily or permanently contained in the unit(s).

All solid materials in the surface impoundment are coal combustion residue and are temporarily stored. The details are as follows:

(1) Fly ash – Approximately 5% of the material is fly ash, coal pyrites and economizer ash. Fly ash is present due to occasional transfer of fly ash during periods of maintenance on the dry fly ash collection system. Coal pyrites are minerals and rocks found in coal that are not milled in the coal pulverizers. Coal pyrites also include a very small amount of unburned coal that is rejected along with the minerals. Economizer ash is lighter than bottom ash and travels to the back-pass of the boiler, but is heavy enough to deposit in the back-pass and not be captured as fly ash. Economizer ash has a consistency similar to sand.
(2) Bottom ash – Approximately 95% of the material is bottom ash and boiler slag.
(3) Boiler slag – This material is included as part of the bottom ash estimate in (2) above. The boiler slag volume can not be separately estimated from the bottom ash mixture.
(4) Flue gas emission control residuals – No flue gas emission control residuals are stored in the surface impoundment.

(5) Other – The surface impoundment also accepts plant waste water and storm water. Annual storm water is estimated at 6.3 million gallons. Waste water averages 300,000 gallons per day, and includes plant service water waste (e.g. non-contact bearing cooling water, wash-down water), water treatment waste water from reverse osmosis and filter backwash, and boiler blow-down. Waste water is discharged from the surface impoundment in accordance with the terms and conditions of an Iowa Department of Natural Resources National Pollution Discharge Elimination System permit, via an outfall to the Mississippi River.

4. Was the management unit(s) designed by a Professional Engineer? Is or was the construction of the waste management unit(s) under the supervision of a Professional Engineer? Is inspection and monitoring of the safety of the waste management unit(s) under the supervision of a Professional Engineer?

The Louisa surface impoundment was not designed by a Professional Engineer, nor was construction under the supervision of a Professional Engineer. As discussed in question #5, inspection and monitoring of the safety of the surface impoundment has been conducted by MidAmerican employees.

5. When did the company last assess or evaluate the safety (i.e., structural integrity) of the management unit(s)? Briefly describe the credentials of those conducting the structural integrity assessments/evaluations. Identify actions taken or planned by facility personnel as a result of these assessments or evaluations. If corrective actions were taken, briefly describe the credentials of those performing the corrective actions, whether they were company employees or contractors. If the company plans an assessment or evaluation in the future, when is it expected to occur?

MidAmerican employees make daily rounds that include an inspection of the perimeter fence adjacent to the road along the eastern portion of the surface impoundment looking for visible signs of surface erosion. Specifically, the employees look for a gap between the perimeter fence and the ground of more than six inches. Any eroded areas are repaired to return the bottom of the fence-to-ground distance to six inches or less. While the structural integrity of the Louisa surface impoundment has not been extensively and formally evaluated, the impoundment is at, or near, the surrounding grade, and therefore, it has a limited potential to breach in a fashion that would result in a sudden and significant release of its contents.

6. When did a State or a Federal regulatory official last inspect or evaluate the safety (structural integrity) of the management unit(s)? If you are aware of a planned state or federal inspection or evaluation in the future, when is it expected to occur? Please identify the Federal or State regulatory agency or department which conducted or is planning the inspection or evaluation. Please provide a copy of the most recent official inspection report or evaluation.

The Louisa surface impoundment has not been the subject of any specific inspections by State or Federal regulatory officials, and MidAmerican is not aware of any planned

inspections. However, numerous regulatory agency inspectors have visited the site for other reasons during the unit's operating history and such inspections may have included a visual observation of the surface impoundment. The Army Corps of Engineers performs periodic inspections of the Mississippi River flood wall near the eastern portion of the surface impoundment.

7. Have assessments or evaluations, or inspections conducted by State or Federal regulatory officials conducted within the past year uncovered a safety issue(s) with the management unit(s), and, if so, describe the actions that have been or are being taken to deal with the issue or issues. Please provide any documentation that you have for these actions.

There have been no assessments, evaluations or inspections by State or Federal regulatory officials within the past year of the Louisa surface impoundment. No other assessments, evaluations or inspections by State or Federal regulatory officials within the past year referenced safety issues regarding the Louisa surface impoundment.

8. What is the surface area (acres) and total storage capacity of each of the management units? What is the volume of materials currently stored in each of the management unit(s). Please provide the date that the volume measurement(s) was taken. Please provide the maximum height of the management unit(s). The basis for determining maximum height is explained later in this Enclosure.

The total surface area of the Louisa surface impoundment is 42 acres, and the total volumetric storage capacity is estimated to be approximately 390,000 cubic yards of coal combustion residue. As of January 31, 2009, the surface impoundment was estimated to contain 195,000 cubic yards of coal combustion residue.

The Louisa surface impoundment sits at, or near, the surrounding grade. The maximum height of the surface impoundment is approximately nine feet as measured from the adjacent land level on the east side of the impoundment down to the lowest nearby land level (approximately 80 feet to the east). However, at least five feet of freeboard is maintained in the surface impoundment.

9. Please provide a brief history of known spills or unpermitted releases from the unit within the last ten years, whether or not these were reported to State or federal regulatory agencies. For purposes of this question, please include only releases to surface water or to the land (do not include releases to groundwater).

There have been no known spills or unpermitted releases from the Louisa surface impoundment within the last ten years.

10. Please identify all current legal owner(s) and operator(s) at the facility.

The legal operator of Louisa Generating Station is MidAmerican Energy Company. The legal owners of Louisa Generating Station, and their respective ownership shares, are

listed below:

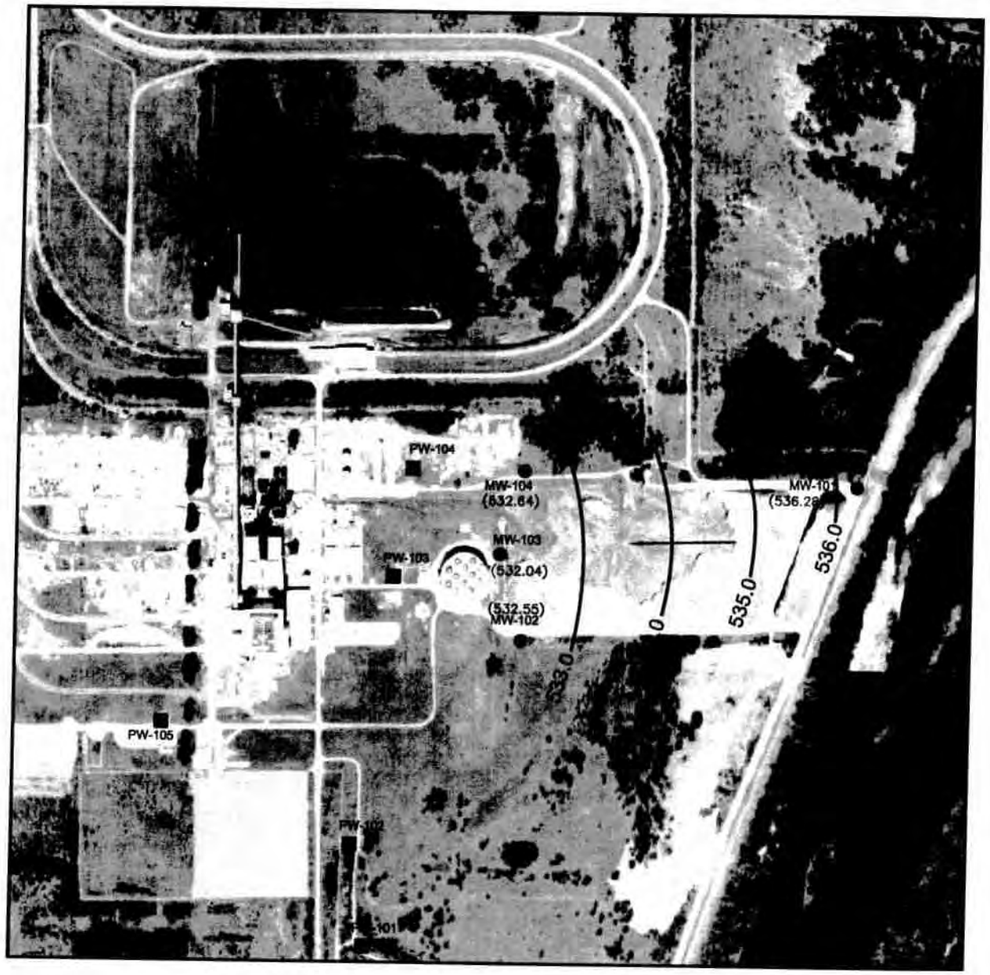
- MidAmerican Energy Company (88.0%)
- Central Iowa Power Cooperative (4.6%)
- Alliant Energy (4.0%)
- City of Waverly, Iowa (1.1%)
- City of Harlan, Iowa (0.8%)
- City of Tipton, Iowa (0.5%)
- City of Eldridge, Iowa (0.5%)
- City of Geneseo, Illinois (0.5%)

I certify that the information contained in this response to EPA's request for information and the accompanying documents is true, accurate, and complete. As to the identified portions of this response for which I cannot personally verify their accuracy, I certify under penalty of law that this response and all attachments were prepared in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fines and imprisonment for knowing violations.

Signature: _____

Name: Reginald R. Soepnel

Title: General Manager – Mississippi River Energy Center



● MONITORING WELL

■ PRODUCTION WELL

(533.27) GROUNDWATER ELEVATION (feet)

GROUNDWATER ELEVATION CONTOUR (feet)

INFERRED DIRECTION OF GROUNDWATER FLOW

DESIGNED BY	ADAM NEWMAN	
DRAWN BY	NORA DAY	
CHECKED BY	SCOTT HANSEN	
APPROVED BY	KEVIN ARMSTRONG	
PROJECT MANAGER	KEVIN ARMSTRONG	

0 400 800
SCALE IN FEET

MANAGING OFFICE: DES MOINES, IOWA

PROJECT: MIDAMERICAN ENERGY COMPANY
LOUISA GENERATING STATION
LOUISA COUNTY, IOWA

TITLE: **GROUNDWATER ELEVATION CONTOUR MAP FEBRUARY 22, 2008**

MWH

FIGURE 8 | REVISION

FILE NAME

P:\CAD\Wellnetwork\Louisa\gwfm-0208.dwg Feb 18, 2008 - 10:51am

MWH

Drilling Log

Monitoring Well **MW-101**

Project *Louisa Generating Station* Owner *MidAmerican Energy Company*

Location *8602 172nd Street, Muscatine, Iowa* Project Number *1914067.0101*

Surface Elev. *568.26 ft* North *862* East *1836*

Top of Casing *570.79 ft* Water Level Initial ▽*537.79* 01/24/08 12:00 Static ▼*538.89* 01/24/08 13:04

Hole Depth *40.0ft* Screen: Diameter *2 in* Length *10.0 ft* Type/Size *PVC/0.01 in*

Hole Diameter *8.25 in* Casing: Diameter *2 in* Length *32.7 ft* Type *PVC*

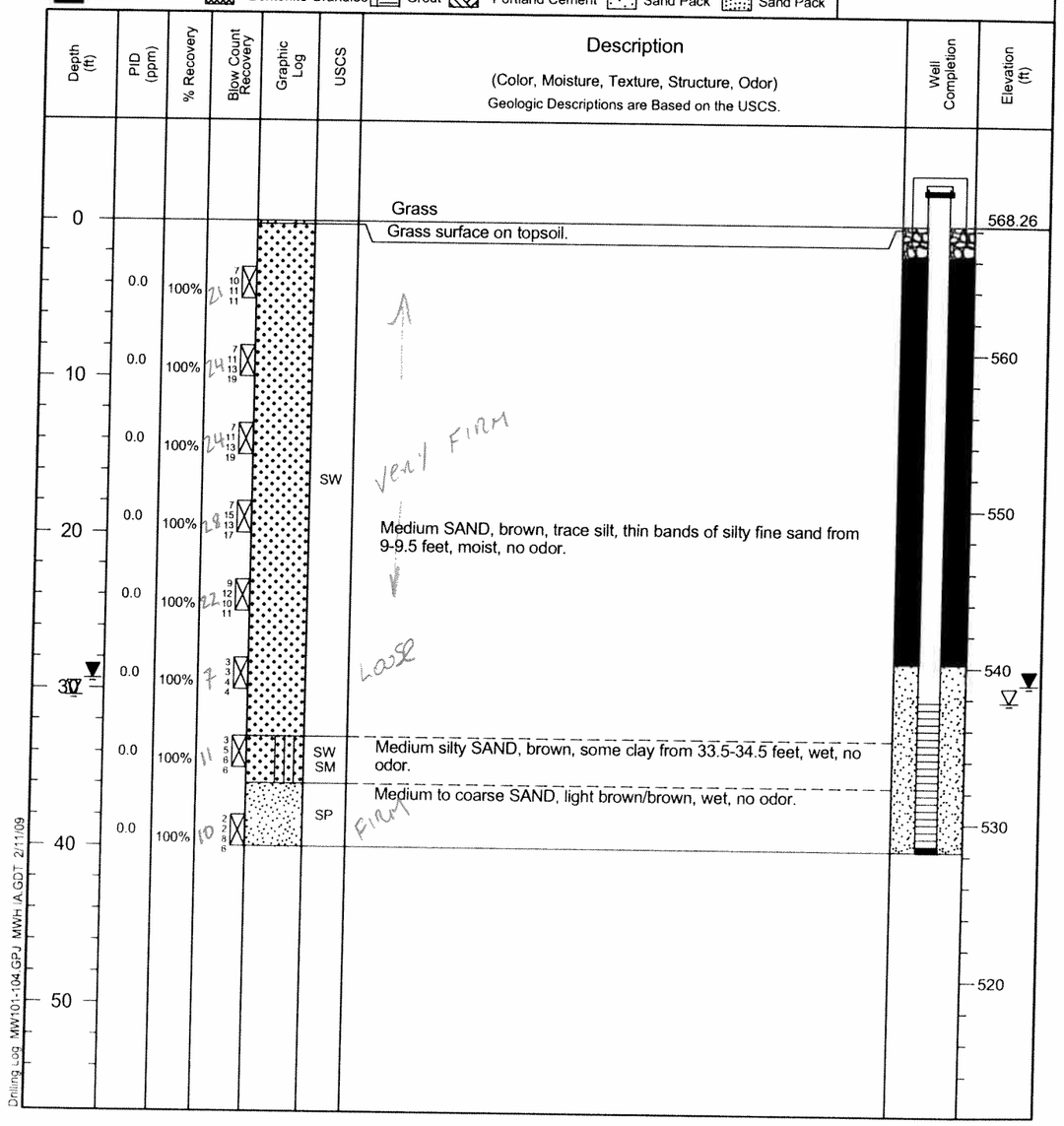
Drill Co. *Thiele Geotech, Inc.* Drilling Method *Hollow Stem Auger/24-inch Diameter* Sand/Pack Size *NA*

Driller *Dave Mather* Driller Reg. # *7892* Log By *Adam Newman*

Start Date *1/23/2008* Completion Date *1/24/2008* Checked By *K. Armstrong*

COMMENTS

Bentonite Grout | Bentonite Granules | Grout | Portland Cement | Sand Pack | Sand Pack



Drilling Log MW101-104.GPJ MWH IA.GDT 2/11/09

MWH

Drilling Log

Monitoring Well **MW-102**

Project *Louisa Generating Station* Owner *MidAmerican Energy Company*

Location *8602 172nd Street, Muscatine, Iowa* Project Number *1914067.0101*

Surface Elev. *567.15 ft* North *0* East *0*

Top of Casing *570.00 ft* Water Level Initial ▽*537* 01/23/08 14:30 Static ▼*535.7* 01/24/08 09:20

Hole Depth *40.0ft* Screen: Diameter *2 in* Length *10.0 ft* Type/Size *PVC/0.01 in*

Hole Diameter *8.25 in* Casing: Diameter *2 in* Length *32.9 ft* Type *PVC*

Drill Co. *Thiele Geotech, Inc.* Drilling Method *Hollow Stem Auger/24-inch Split Spoon* Backfill *NA*

Driller *Dave Mather* Driller Reg. # *7892* Log By *Adam Newman*

Start Date *1/23/2008* Completion Date *1/23/2008* Checked By *K. Armstrong*

COMMENTS

Bentonite Grout | Bentonite Granules | Grout | Portland Cement | Sand Pack | Sand Pack

Depth (ft)	PID (ppm)	% Recovery	Blow Count Recovery	Graphic Log	USCS	Description (Color, Moisture, Texture, Structure, Odor) Geologic Descriptions are Based on the USCS.	Well Completion	Elevation (ft)
0						Grass		567.15
	0.0	100%	6 (1 3 3 4)		SW	Grass surface on topsoil. Medium SAND, brown, some fine to coarse angular gravel and trace silt, moist, no odor.		
10	0.0	100%	4 (2 1 3 2)			VERY Loose		560
	0.0	100%	5 (3 2 3 2)			↓ FIRM		
20	0.0	100%	20 (6 9 11 13)		SW	Medium SAND, brown, some fine to coarse well rounded gravel 18-20 feet, moist, no odor.		550
	0.0	100%	9 (2 4 5 7)			Loose		
30 ▽ ▼	0.0	100%	16 (10 8 8 8)			FIRM		540
	0.0	100%	8 (5 5 3 3)		SP	Loose Medium to coarse SAND, brown, some fine to coarse well rounded gravel, moist, wet at 33 feet, no odor.		530
40	0.0	100%	13 (4 6 7 6)			FIRM		
50								520

MWH

Drilling Log

Monitoring Well **MW-103**

Project *Louisa Generating Station* Owner *MidAmerican Energy Company*

Location *8602 172nd Street, Muscatine, Iowa* Project Number *1914067.0101*

Surface Elev. *579.85 ft* North *475* East *-123*

Top of Casing *582.99 ft* Water Level Initial ▽*535.99* 01/22/08 14:30 Static ▼*535.84* 01/23/08 10:25

Hole Depth *54.0ft* Screen: Diameter *2 in* Length *10.0 ft* Type/Size *PVC/0.01 in*

Hole Diameter *8.25 in* Casing: Diameter *2 in* Length *43.3 ft* Type *PVC*

Drill Co. *Thiele Geotech, Inc.* Drilling Method *Hollow Stem Auger/24-inch Sandfall* Backfill *NA*

Driller *Dave Mather* Driller Reg. # *7892* Log By *Adam Newman*

Start Date *1/22/2008* Completion Date *1/22/2008* Checked By *K. Armstrong*

COMMENTS
Top of casing is approximately 3.3 feet above ground surface.

Bentonite Grout | Bentonite Granules | Grout | Portland Cement | Sand Pack | Sand Pack

Depth (ft)	PID (ppm)	% Recovery	Blow Count Recovery	Graphic Log	USCS	Description (Color, Moisture, Texture, Structure, Odor) Geologic Descriptions are Based on the USCS.	Well Completion	Elevation (ft)
0						Grass Grass surface on topsoil.		579.85
5	0.0	100%	4 5 6 7 / 3 3 5 4 / 2 4 4 4 / 1 3 5 3 / 2 3 5 4 / 2 4 3 4 / 2 3 4 2 / 3 3 5 2 / 3 4 5 2 / 2 3 5 4 / 3 6 11 11 / 5 8 10 12 / 4 8 11 9		SW	Medium SAND, brown to 21 feet/ light brown 21 to 31 feet, trace silt, little moisture, moist at 15 feet, no odor.		575
10	0.0	100%						570
15	0.0	100%						565
20	0.0	100%						560
25	0.0	100%						555
30		100%						550

Firm

Loose

Firm

Continued Next Page

Drilling Log

Monitoring Well **MW-103**

Project *Louisa Generating Station* Owner *MidAmerican Energy Company*

Location *8602 172nd Street, Muscatine, Iowa* Project Number *1914067.0101*

Depth (ft)	PID (ppm)	% Recovery	Blow Count / Recovery	Graphic Log	USCS	Description (Color, Moisture, Texture, Structure, Odor) Geologic Descriptions are Based on the USCS.	Well Completion	Elevation (ft)
						Continued		
30			7 8 12 20		SW	FIRM		
		100%	12 6 6 15					
		100%	9 12 3 3 6			Loose		
35		100%	3 4 2 3 8					545
		100%	5 5 4 6 15			FIRM		
		100%	9 8 6 8 20					540
40		100%	12 10 7 10 20		SP	Medium to coarse SAND, brown/light brown, some fine to coarse subangular to subrounded gravel, moist, wet at 47 feet, no odor.		
		100%	10 10 6 9 16					535
45	0.0	100%	7 7 5 5 12					
		100%	7 11					530
50								
		100%	1 4 5 7 9			Loose		525
55								
60								520
								515
65								
70								510

MWH

Drilling Log

Monitoring Well **MW-104**

Project *Louisa Generating Station* Owner *MidAmerican Energy Company*

Location *8602 172nd Street, Muscatine, Iowa* Project Number *1914067.0101*

Surface Elev. *577.97 ft* North *932* East *4*

Top of Casing *580.82 ft* Water Level Initial ▽*537.82* 01/23/08 12:00 Static ▼*535.72* 01/24/08 08:00

Hole Depth *50.0ft* Screen: Diameter *2 in* Length *10.0 ft* Type/Size *PVC/0.01 in*

Hole Diameter *8.25 in* Casing: Diameter *2 in* Length *42.8 ft* Type *PVC*

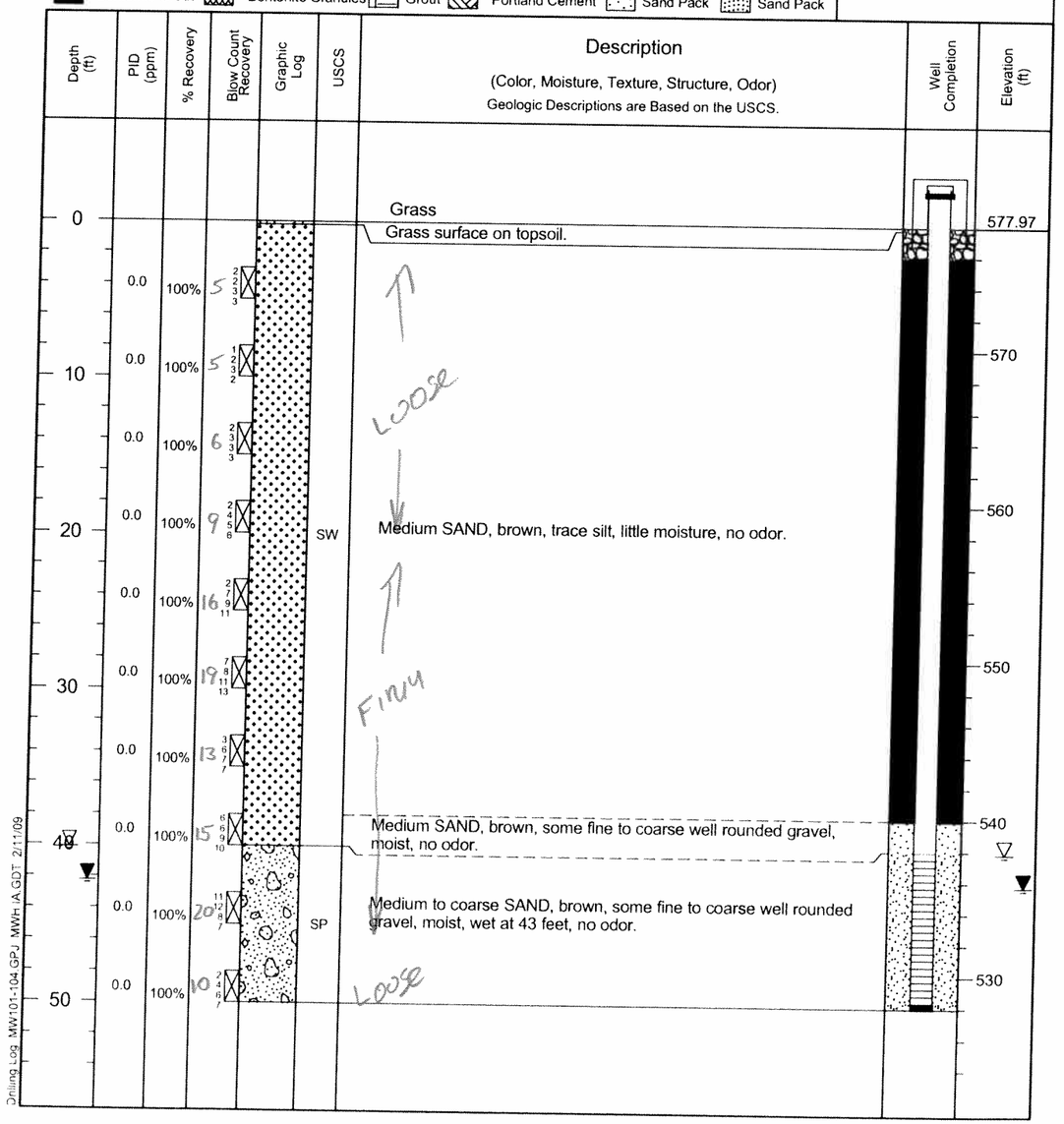
Drill Co. *Thiele Geotech, Inc.* Drilling Method *Hollow Stem Auger/24-inch Diameter* Backfill Method *NA*

Driller *Dave Mather* Driller Reg. # *7892* Log By *Adam Newman*

Start Date *1/23/2008* Completion Date *1/23/2008* Checked By *K. Armstrong*

COMMENTS

Bentonite Grout | Bentonite Granules | Grout | Portland Cement | Sand Pack | Sand Pack



MONITORING WELL

DESIGNED BY	SCOTT HANSEN	
DRAWN BY	NORA DAY	
CHECKED BY	SCOTT HANSEN	
APPROVED BY	KEVIN ARMSTRONG	
PROJECT MANAGER	KEVIN ARMSTRONG	

0 400 800
SCALE IN FEET

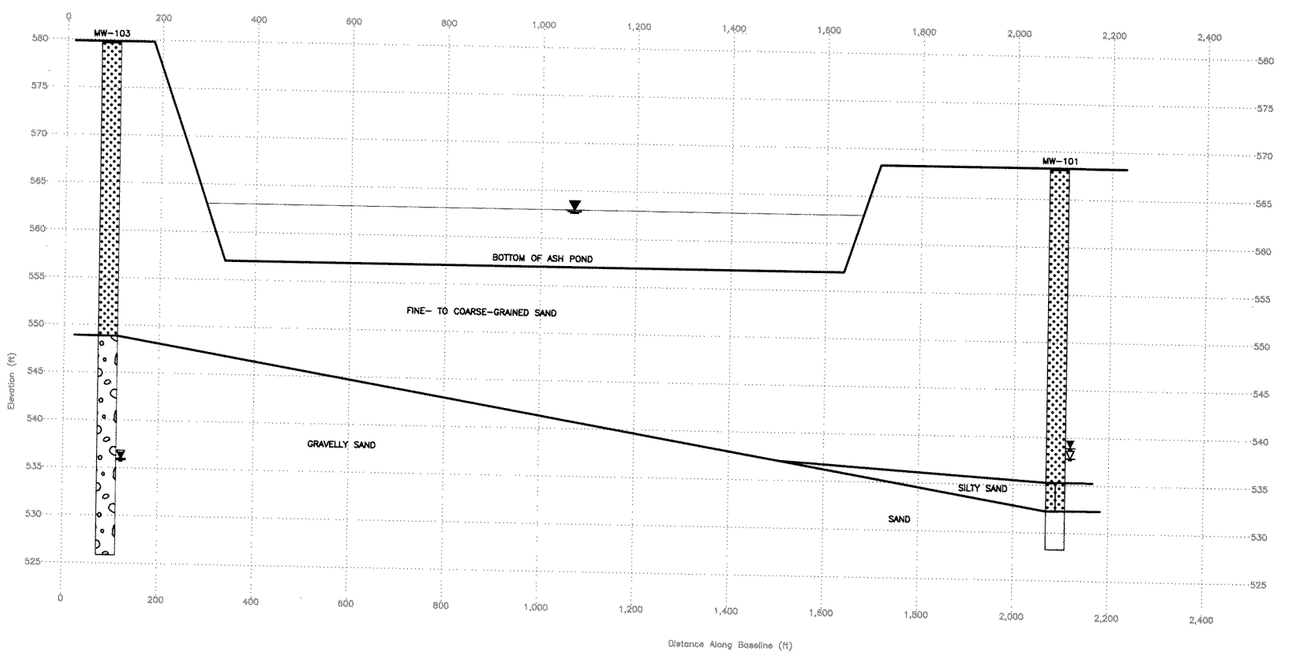
MANAGING OFFICE: DES MOINES, IOWA
PROJECT: MIDAMERICAN ENERGY COMPANY
LOUISA GENERATING STATION
LOUISA COUNTY, IOWA

TITLE: **HYDROGEOLOGIC CROSS-SECTION LOCATION MAP**

MWH

FIGURE: 5
REVISION:
FILE NAME:

P:\GIS\MidAmerican\Louisa\sam.dwg Feb 09, 2009 - 8:46am



LITHOLOGY GRAPHICS

- Topsoil
- USCS Well-graded Sand
- USCS Well-graded Sand with Silt
- USCS Poorly-graded Sand
- USCS Poorly-graded Gravelly Sand

VERTICAL EX = 20

0 5 10

SCALE IN FEET

0 100 200

DESIGNED BY	SCOTT HANNEN
DRAWN BY	NORA DAY
CHECKED BY	SCOTT HANNEN
APPROVED BY	KEVIN ARMSTRONG
PROJECT MANAGER	KEVIN ARMSTRONG

MANAGING OFFICE: DES MOINES, IOWA

PROJECT: MIDAMERICAN ENERGY COMPANY
LOUISA GENERATING STATION
LOUISA COUNTY, IOWA

TITLE: HYDROGEOLOGIC CROSS-SECTION
A-A'

MWH

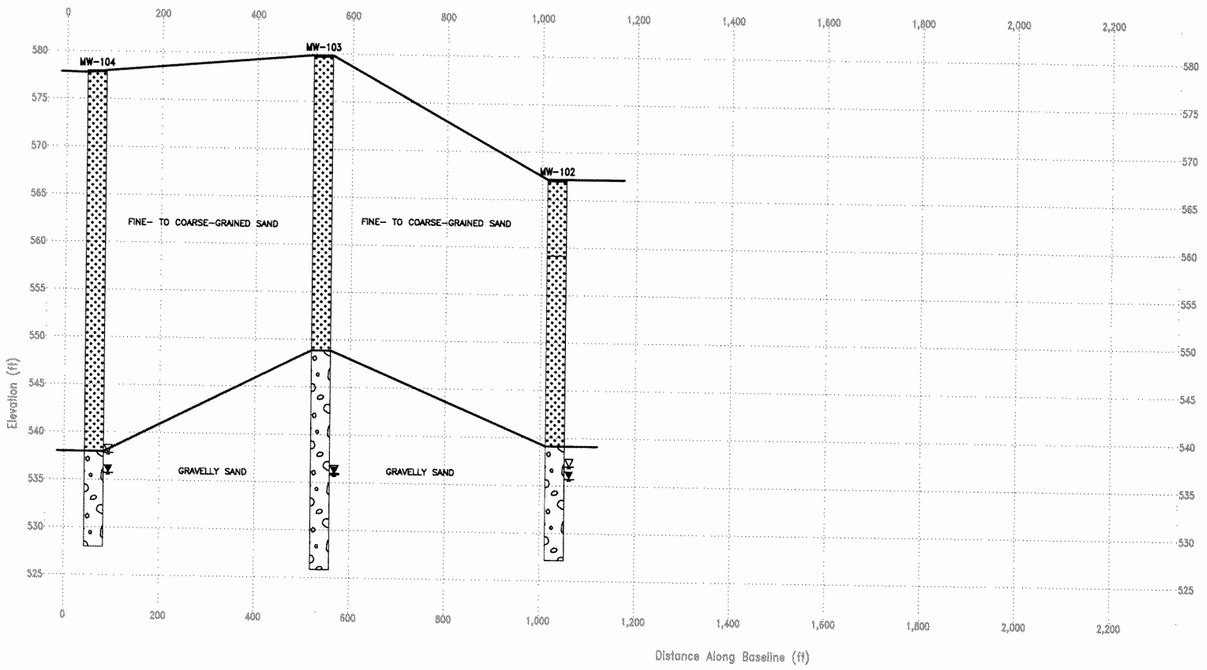
FIGURE: 6

REVISION:

FILE NAME:

B

B'



LITHOLOGY GRAPHICS

Topsoil

USCS Well-graded Sand

USCS Poorly-graded Gravelly Sand

VERTICAL EX = 20

0 5 10

0 100 200

SCALE IN FEET

DESIGNED BY	SCOTT HANSEN
DRAWN BY	NORA DAY
CHECKED BY	SCOTT HANSEN
APPROVED BY	KEVIN ARMSTRONG
PROJECT MANAGER	KEVIN ARMSTRONG

MANAGING OFFICE DES MOINES, IOWA

PROJECT MIDAMERICAN ENERGY COMPANY
LOUISA GENERATING STATION
LOUISA COUNTY, IOWA

TITLE HYDROGEOLOGIC CROSS-SECTION
B-B'

MWH

FIGURE 7

REVISION

FILE NAME

● MONITORING WELL

■ PRODUCTION WELL

(533.27) GROUNDWATER ELEVATION (feet)

GROUNDWATER ELEVATION CONTOUR (feet)

INFERRED DIRECTION OF GROUNDWATER FLOW

DESIGNED BY	ADAM NEWMAN	
DRAWN BY	NORA DAY	
CHECKED BY	SCOTT HANSEN	
APPROVED BY	KEVIN ARMSTRONG	
PROJECT MANAGER	KEVIN ARMSTRONG	

0 400 800
SCALE IN FEET

MANAGING OFFICE: DES MOINES, IOWA

PROJECT: MIDAMERICAN ENERGY COMPANY
LOUISA GENERATING STATION
LOUISA COUNTY, IOWA

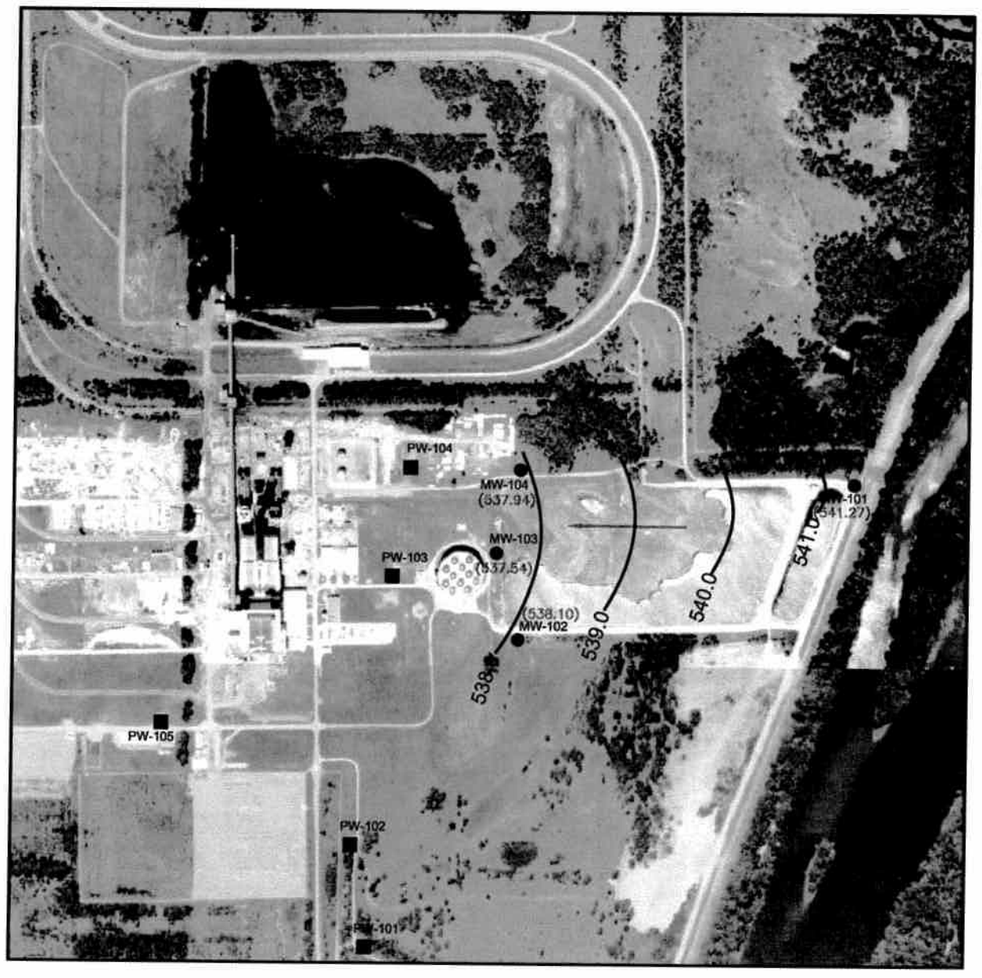
TITLE: **GROUNDWATER ELEVATION CONTOUR MAP FEBRUARY 22, 2008**

MWH

FIGURE 8 | REVISION

FILE NAME

P:\CAD\MidAmerican\Louisa\gwfm-0208.dwg Feb 18, 2009 - 10:51:cm



● MONITORING WELL

■ PRODUCTION WELL

(533.27) GROUNDWATER ELEVATION (feet)

GROUNDWATER ELEVATION CONTOUR (feet)

INFERRED DIRECTION OF GROUNDWATER FLOW

DESIGNED BY	ADAM NEWMAN	
DRAWN BY	NORA DAY	
CHECKED BY	SCOTT HANSEN	
APPROVED BY	KEVIN ARMSTRONG	
PROJECT MANAGER	KEVIN ARMSTRONG	

0 400 800
SCALE IN FEET

MANAGING OFFICE DES MOINES, IOWA

PROJECT MIDAMERICAN ENERGY COMPANY
LOUISA GENERATING STATION
LOUISA COUNTY, IOWA

TITLE **GROUNDWATER ELEVATION CONTOUR MAP MAY 27, 2008**

MWH

FIGURE 9

REVISION .

FILE NAME .

P:\CAD\Midamerican\Louisa\pdfm-0008.dwg Feb 11, 2009 - 2:04pm

- MONITORING WELL
- PRODUCTION WELL
- (534.55) GROUNDWATER ELEVATION (feet)
- GROUNDWATER ELEVATION CONTOUR (feet)
- INFERRED DIRECTION OF GROUNDWATER FLOW

N

DESIGNED BY	SCOTT HANSEN	
DRAWN BY	NORA DAY	
CHECKED BY	SCOTT HANSEN	
APPROVED BY	KEVIN ARMSTRONG	
PROJECT MANAGER	KEVIN ARMSTRONG	

0 400 800
SCALE IN FEET

MANAGING OFFICE: DES MOINES, IOWA

PROJECT: MIDAMERICAN ENERGY COMPANY
LOUISA GENERATING STATION
LOUISA COUNTY, IOWA

TITLE: **GROUNDWATER ELEVATION CONTOUR MAP SEPTEMBER 25, 2008**

MWH

FIGURE 10 | REVISION

FILE NAME

P:\CAD\MidAmerican\Louisa\gwlm--0908.dwg Feb 11, 2009 - 2:07pm

- MONITORING WELL
- PRODUCTION WELL
- (533.05) GROUNDWATER ELEVATION (feet)
- GROUNDWATER ELEVATION CONTOUR (feet)
- INFERRED DIRECTION OF GROUNDWATER FLOW

DESIGNED BY	SCOTT HANSEN	
DRAWN BY	NORA DAY	
CHECKED BY	SCOTT HANSEN	
APPROVED BY	KEVIN ARMSTRONG	
PROJECT MANAGER	KEVIN ARMSTRONG	

0 400 800
SCALE IN FEET

MANAGING OFFICE: DES MOINES, IOWA

PROJECT: MIDAMERICAN ENERGY COMPANY
LOUISA GENERATING STATION
LOUISA COUNTY, IOWA

TITLE: **GROUNDWATER ELEVATION CONTOUR MAP DECEMBER 10, 2008**

MWH

FIGURE 11 | REVISION

FILE NAME

P:\CAD\Midamerican\Louisa\gwfm-1208.dwg Feb 11, 2009 - 2:06pm

Drilling Log

Monitoring Well **MW-101**

Project *Louisa Generating Station* Owner *MidAmerican Energy Company*

Location *8602 172nd Street, Muscatine, Iowa* Project Number *1914067.0101*

Surface Elev. *568.26 ft* North *862* East *1836*

Top of Casing *570.79 ft* Water Level Initial ▽*537.79* 01/24/08 12:00 Static ▼*538.89* 01/24/08 13:04

Hole Depth *40.0ft* Screen: Diameter *2 in* Length *10.0 ft* Type/Size *PVC/0.01 in*

Hole Diameter *8.25 in* Casing: Diameter *2 in* Length *32.7 ft* Type *PVC*

Drill Co. *Thiele Geotech, Inc.* Drilling Method *Hollow Stem Auger/24-inch Split Spoon* Sampling Method *NA*

Driller *Dave Mather* Driller Reg. # *7892* Log By *Adam Newman*

Start Date *1/23/2008* Completion Date *1/24/2008* Checked By *K. Armstrong*

COMMENTS

Bentonite Grout | Bentonite Granules | Grout | Portland Cement | Sand Pack | Sand Pack

Depth (ft)	PID (ppm)	% Recovery	Blow Count Recovery	Graphic Log	USCS	Description (Color, Moisture, Texture, Structure, Odor) Geologic Descriptions are Based on the USCS.	Well Completion	Elevation (ft)
0						Grass Grass surface on topsoil.		568.26
	0.0	100%	7 10 11 11					
10	0.0	100%	7 11 13 19					560
	0.0	100%	7 11 13 19		SW			
20	0.0	100%	7 15 13 17			Medium SAND, brown, trace silt, thin bands of silty fine sand from 9-9.5 feet, moist, no odor.		550
	0.0	100%	9 12 10 11					
30 ▽	0.0	100%	3 3 4 4					540 ▼
	0.0	100%	3 5 6 6		SW SM	Medium silty SAND, brown, some clay from 33.5-34.5 feet, wet, no odor.		
						Medium to coarse SAND, light brown/brown, wet, no odor.		
40	0.0	100%	2 2 3 6		SP			530
								520
50								

Drilling Log MW101-104.GPJ MWH IA.GDT 2/1/09

Drilling Log

MWH

Monitoring Well **MW-102**

Page: 1 of 1

Project *Louisa Generating Station* Owner *MidAmerican Energy Company*

Location *8602 172nd Street, Muscatine, Iowa* Project Number *1914067.0101*

Surface Elev. *567.15 ft* North *0* East *0*

Top of Casing *570.00 ft* Water Level Initial ▽*537* 01/23/08 14:30 Static ▼*535.7* 01/24/08 09:20

Hole Depth *40.0ft* Screen: Diameter *2 in* Length *10.0 ft* Type/Size *PVC/0.01 in*

Hole Diameter *8.25 in* Casing: Diameter *2 in* Length *32.9 ft* Type *PVC*

Drill Co. *Thiele Geotech, Inc.* Drilling Method *Hollow Stem Auger/24-inch Sand Spoon* Backfill *NA*

Driller *Dave Mather* Driller Reg. # *7892* Log By *Adam Newman*

Start Date *1/23/2008* Completion Date *1/23/2008* Checked By *K. Armstrong*

COMMENTS

Bentonite Grout | Bentonite Granules | Grout | Portland Cement | Sand Pack | Sand Pack

Depth (ft)	PID (ppm)	% Recovery	Blow Count Recovery	Graphic Log	USCS	Description (Color, Moisture, Texture, Structure, Odor) Geologic Descriptions are Based on the USCS.	Well Completion	Elevation (ft)
0						Grass		567.15
	0.0	100%	1 2 3 4		SW	Grass surface on topsoil. Medium SAND, brown, some fine to coarse angular gravel and trace silt, moist, no odor.		
10	0.0	100%	2 1 2 3					560
	0.0	100%	3 2 3 2					
20	0.0	100%	6 9 11 13		SW	Medium SAND, brown, some fine to coarse well rounded gravel 18-20 feet, moist, no odor.		550
	0.0	100%	2 4 5 7					
30	0.0	100%	10 8 8 8					540
	0.0	100%	5 5 3 3		SP	Medium to coarse SAND, brown, some fine to coarse well rounded gravel, moist, wet at 33 feet, no odor.		
40	0.0	100%	4 6 7 6					530
								520
50								

Drilling Log MW101-104.GPJ MWH IA.GDT 2/11/09

Drilling Log

Monitoring Well **MW-103**

Project *Louisa Generating Station* Owner *MidAmerican Energy Company*

Location *8602 172nd Street, Muscatine, Iowa* Project Number *1914067.0101*

Surface Elev. *579.85 ft* North *475* East *-123*

Top of Casing *582.99 ft* Water Level Initial ▽*535.99* 01/22/08 14:30 Static ▼*535.84* 01/23/08 10:25

Hole Depth *54.0ft* Screen: Diameter *2 in* Length *10.0 ft* Type/Size *PVC/0.01 in*

Hole Diameter *8.25 in* Casing: Diameter *2 in* Length *43.3 ft* Type *PVC*

Drill Co. *Thiele Geotech, Inc.* Drilling Method *Hollow Stem Auger/24-inch Split Spoon* Sampling Method *NA*

Driller *Dave Mather* Driller Reg. # *7892* Log By *Adam Newman*

Start Date *1/22/2008* Completion Date *1/22/2008* Checked By *K. Armstrong*

Bentonite Grout | Bentonite Granules | Grout | Portland Cement | Sand Pack | Sand Pack

COMMENTS
Top of casing is approximately 3.3 feet above ground surface.

Depth (ft)	PID (ppm)	% Recovery	Blow Count Recovery	Graphic Log	USCS	Description (Color, Moisture, Texture, Structure, Odor) Geologic Descriptions are Based on the USCS.	Well Completion	Elevation (ft)
0						Grass Grass surface on topsoil.		579.85
5	0.0	100%	4 5 6 7					
	0.0	100%	3 3 5 4					
	0.0	100%	2 4 4 4					
10	0.0	100%	1 3 5 3					570
	0.0	100%	2 3 5 4					
	0.0	100%	2 4 3 4					
15	0.0	100%	2 3 3 4		SW	Medium SAND, brown to 21 feet/ light brown 21 to 31 feet, trace silt, little moisture, moist at 15 feet, no odor.		565
	0.0	100%	2 3 3 4					
	0.0	100%	2 3 3 5					
20	0.0	100%	2 3 4 5					560
		100%	2 3 5 4					
		100%	3 6 11 11					555
		100%	5 8 10 12					
		100%	4 8 11 9					
30		100%						550

Continued Next Page

Drilling Log

MWH

Monitoring Well **MW-103**

Project *Louisa Generating Station* Owner *MidAmerican Energy Company*

Location *8602 172nd Street, Muscatine, Iowa* Project Number *1914067.0101*

Depth (ft)	PID (ppm)	% Recovery	Blow Count Recovery	Graphic Log	USCS	Description (Color, Moisture, Texture, Structure, Odor) Geologic Descriptions are Based on the USCS.	Well Completion	Elevation (ft)
						Continued		
30			7 8 12		SW			
		100%	12 6 6					
35		100%	9 12 3 3 3 4					545
		100%	2 3 5 5 4 6					
40		100%	9 8 6 8 12 10					540
		100%	7 10 10 10 6		SP	Medium to coarse SAND, brown/light brown, some fine to coarse subangular to subrounded gravel, moist, wet at 47 feet, no odor.		
45		100%	9 7 7 5 5 7					535
	0.0	100%	11					
50			1 4 5 7					530
		100%						
55								525
60								520
65								515
70								510

Drilling Log

Monitoring Well **MW-104**

Project *Louisa Generating Station* Owner *MidAmerican Energy Company*

Location *8602 172nd Street, Muscatine, Iowa* Project Number *1914067.0101*

Surface Elev. *577.97 ft* North *932* East *4*

Top of Casing *580.82 ft* Water Level Initial ▽*537.82* 01/23/08 12:00 Static ▼*535.72* 01/24/08 08:00

Hole Depth *50.0ft* Screen: Diameter *2 in* Length *10.0 ft* Type/Size *PVC/0.01 in*

Hole Diameter *8.25 in* Casing: Diameter *2 in* Length *42.8 ft* Type *PVC*

Drill Co. *Thiele Geotech, Inc.* Drilling Method *Hollow Stem Auger/24-inch Sand Pack* Sampling Method *NA*

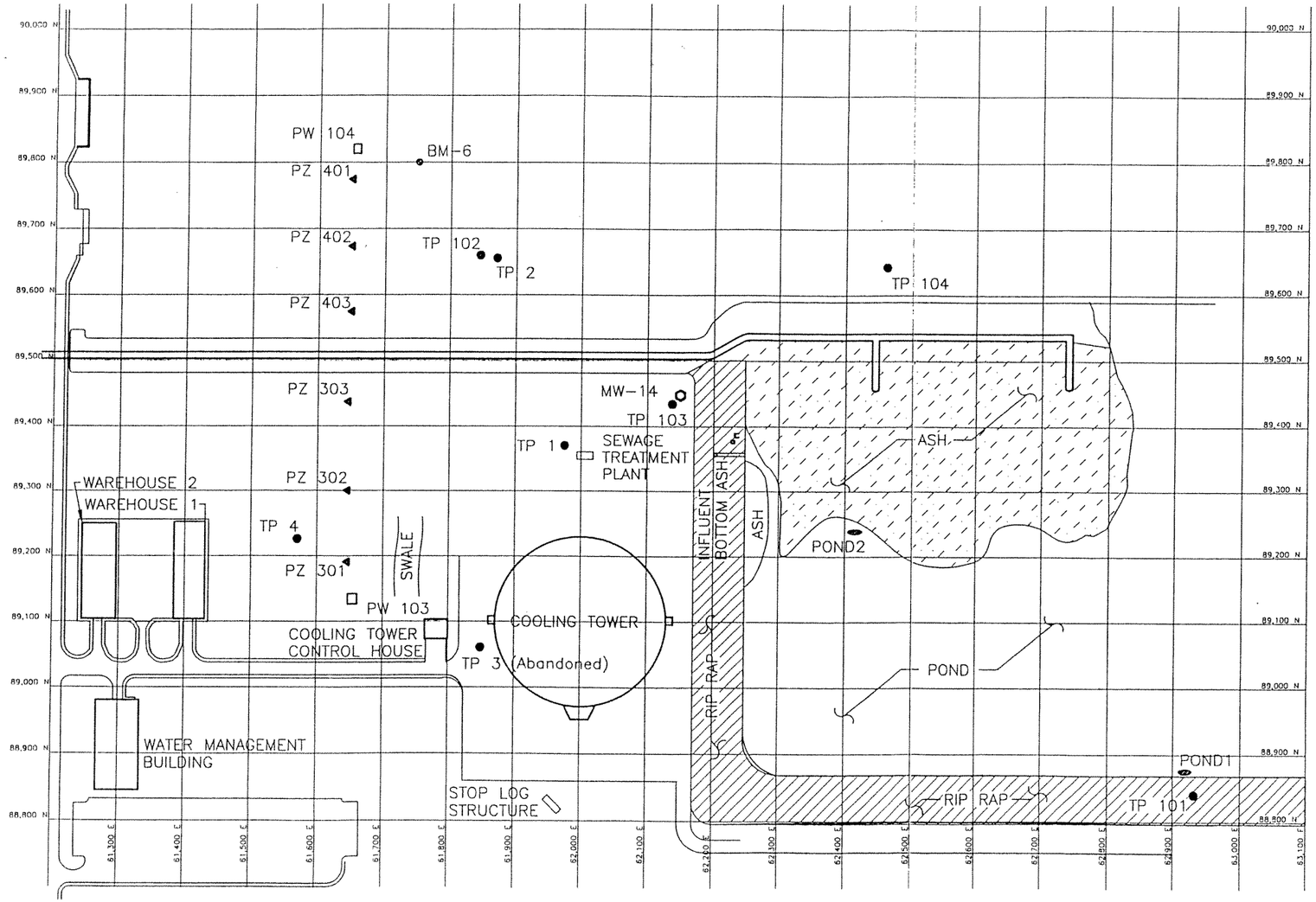
Driller *Dave Mather* Driller Reg. # *7892* Log By *Adam Newman*

Start Date *1/23/2008* Completion Date *1/23/2008* Checked By *K. Armstrong*

COMMENTS

Bentonite Grout | Bentonite Granules | Grout | Portland Cement | Sand Pack | Sand Pack

Depth (ft)	PID (ppm)	% Recovery	Blow Count Recovery	Graphic Log	USCS	Description (Color, Moisture, Texture, Structure, Odor) Geologic Descriptions are Based on the USCS.	Well Completion	Elevation (ft)
0						Grass Grass surface on topsoil.		577.97
10	0.0	100%	2 2 3 3					
	0.0	100%	1 2 3 2					570
	0.0	100%	2 3 3 3					
20	0.0	100%	2 4 5 6		SW	Medium SAND, brown, trace silt, little moisture, no odor.		560
	0.0	100%	2 7 9 11					
30	0.0	100%	7 8 11 13					550
	0.0	100%	3 6 7 7					
40	0.0	100%	6 6 9 10			Medium SAND, brown, some fine to coarse well rounded gravel, moist, no odor.		540
	0.0	100%	11 12 8 7		SP	Medium to coarse SAND, brown, some fine to coarse well rounded gravel, moist, wet at 43 feet, no odor.		
50	0.0	100%	2 4 6 7					530



0 200 400

SCALE IN FEET

BM-6 — Survey Benchmark (Elev.= MSL)

PW 104 — Pumping Well (Existing)

PZ 401 — Piezometer (Existing 4"-6" Diameter)

TP 4 — Temporary Piezometer (Installed 1996)

TP 104 — Soil Boring and Temporary Piezometer (Installed 1998)

POND1 — Surface Water Sample

PVJ 9494_1.DWG 200.00 10/06/1998 06:50:05

Figure 4

SAMPLE LOCATION MAP

Louisa Station
Muscatine, Iowa

Barr Engineering Company | **Ref. Boring # TP-101** | **Well # TP-101**

Project: MidAmerican Energy Louisa Plant

Project Number:	15/700-001 JSA 200	**Total Drilled Depth:**	165'
Boring Location:	680' east of SW corner of ash pond	**Ground Surface Elevation (ft):**	566.47
Drilling Contractor:	Bergerson-Caswell	**Depth to Groundwater (ft):**	28.4'
Drilling Method:	Hollow-Stem Auger/Mud Rotary	**Riser Elevation:**	566.20
Driller:	Glenn H.	**Date Started:**	7/9/98
Geologist:	Fawna Korhonen	**Date Completed:**	7/15/98
		Unique #:	NA

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Depth (ft. bgs)	Recovery (ft)	Blow Count	Odor\Sheen	Moisture/W.L.	Estimated % of Gravel\Sand\Fine	ASTM	Lithologic Unit	Material Descriptions and Remarks	Well Construction/ Comments	Elevation
0								POORLY-GRADED SAND: Brown (10YR4/6), fine- to medium-grained, subrounded to subangular, quartz-rich, carbonates, trace mafics, trace fine-grained, subrounded to subangular gravel, trace fines, no laminations, soft.	Grouted annulus	566
2					5/90/5	SP				564
4	1' 2"	4,6,6,8	N/N	Moist						562
6										560
8	1' 8"	6,8,10,25	N/N	Moist	3/77/20	SP			2" sch. 80 PVC casing	558
10										556
12	1' 10"	8,12,15,15	N/N	Moist				POORLY-GRADED SAND: Brown (10YR4/4), fine- to medium-grained, subrounded to subangular, quartz/carbonate-rich, trace mafics, trace gravel, discrete silt laminations		554
14										552
16										550
18	1' 10"	6,10,14,14	N/N	Moist						548
20										546
22									Bentonite chips	544
24	2'	3,3,3,3	N/N	Moist	0/80/20	SP/SM		SILTY SAND: Brown, very fine- to fine-grained sand with 15-20% silt, no gravel, no laminations, firm.	Sand pack (45/55)	542
26										540
28	1' 9"	4,4,6,8	N/N	Sat						538
30										536
32	1' 10"	3,3,3,3	N/N	Sat				POORLY-GRADED SAND WITH GRAVEL: Brown (10YR4/4), fine- to coarse-grained sand, subrounded to subangular, 10% fine- to medium-sized gravel, mafic-rich, subrounded to subangular, polished and flattened, 10-5% fines, no laminations.	GW-1 (27-35') 2" PVC sch. 80, No. 10 slot screen	534
34										532
36										530
38										528
40										526
42										524
44										522
46										520
48										518
50	8"	4,10,15,15	N/N	Sat						516
52										514
54										512
56										510
58										508
60									GW-2 (55-60')	506
62										504
64										502
66					10/80/10	SP				500
68										498
70	1'	4,6,8,10	N/N	Sat						496
72										494
74										492
76										490
78										488
80										486
82										484

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Barr Engineering Company

Ref. Boring # TP-101

Well # TP-101

Depth (ft. bgs)	Recovery (ft.)	Blow Count	Odor\Sheen	Moisture\W.L.	Estimated % of Gravel\Sand\Fine	ASTM	Lithologic Unit	Material Descriptions and Remarks	Well Construction/ Comments	Elevation
84										482
86										480
88										478
90										476
92	1'	4,6,12,15	N/N	Sat						474
94									GW-3 (90-95')	472
96										470
98										468
100										466
102								GRAVEL AND SAND: 55% fine- to		464
104					55/35/10	GP		medium-sized gravel, subrounded to subangular, 35% medium- to coarse-grained brown sand, 10% gray sandy clay nodules.		462
106										460
108					20/75/5	SP				458
110										456
112	8"	8,10,12,16	N/N	Sat				POORLY-GRADED SAND WITH GRAVEL: Gray (10YR4/1) fine-grained sand, subrounded, quartz/mafic-rich, 20% fine- to medium-sized gravel, trace fines, soft.		454
114										452
116										450
118										448
120								POORLY-GRADED SAND: Brown (10YR4/6) fine- to medium-grained sand, subrounded to subangular, trace fines, no gravel, no laminations, firm.		446
122										444
124					0/95/5				GW-4 (120-125')	442
126										440
128										438
130										436
132										434
134										432
136								GRAVEL AND SAND: 60% gray medium- to coarse-grained sand, subrounded to subangular, quartz/mafic-rich, trace fine-grained sand, 40% fine-sized gravel, subrounded to subangular, mafics are elongated and polished.		430
138										428
140										426
142					40/58/2	SP				424
144										422
146										420
148										418
150								POORLY-GRADED SAND: Gray (10YR4/1) fine- to coarse-grained, subrounded to subangular, quartz-rich, 10%mafics, 10% fines, no gravel, stiff.		416
152	9"	10,6,16,20	N/N	Sat	0/90/10	SP			GW-5 (150-155')	414
154										412
156										410
158					40/58/2	SP		POORLY-GRADED SAND WITH GRAVEL: Gray medium- to coarse-grained sand with 40% fine- to medium-sized gravel. Augers very chattery at 155'.		408
160										406
162										404
164										402
166								LIMESTONE: White to tan limestone, crystalline, no fossils.		400
168										398
170										

Barr Engineering Company | **Ref. Boring # TP-102** | **Well # TP-102**

Project: MidAmerican Energy Louisa Plant

Project Number:	15/700-001 JSA 200	**Total Drilled Depth:**	175'
Boring Location:	16' west of TP-2	**Ground Surface Elevation (ft):**	577.93
Drilling Contractor:	Bergerson-Caswell	**Depth to Groundwater (ft):**	43.5'
Drilling Method:	Hollow-Stem Auger/Mud Rotary	**Riser Elevation:**	580.26
Driller:	Glenn H.	**Date Started:**	7/21/98
Geologist:	Fawna Korhonen	**Date Completed:**	7/22/98
		Unique #:	NA

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Depth (ft. bgs)	Recovery (ft)	Blow Count	Odor\Sheen	Moisture/W.L.	Estimated % of Gravel\Sand\Fine	ASTM	Lithologic Unit	Material Descriptions and Remarks	Well Construction/ Comments	Elevation
0				Dry	0/95/5	SP		POORLY-GRADED SAND: Dark brown (10YR4/3), fine- to medium-grained, subrounded to subangular, quartz-rich, no gravel, no laminations.		0
10	1.9'	3,3,4,6,	N/N	Moist				POORLY-GRADED SAND: Brown (10YR5/4), fine- to medium-grained, trace coarse-grained, subrounded to subangular, increased mafic content, no gravel, trace fines, only laminations found were of coarser sand at 40', soft.	2" PVC sch. 80 casing	-10
26					0/95/5	SP			Grouted annulus	-26
40	1.5'	4,4,5,6	N/N	Moist						-40
44	1.5'	4,4,4,4	N/N	Wet				POORLY-GRADED SAND WITH GRAVEL: Brown (10YR5/3), fine- to coarse-grained sand, subrounded to subangular, quartz/mafic-rich, some carbonates, 10-15% fine- to medium-sized gravel, subrounded to subangular, trace fines, no laminations.	▽ GW-1 (42-50')	-44
72					15/80/5	SP				-72
78										-78

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Barr Engineering Company

Ref. Boring # TP-102

Well # TP-102

Depth (ft. bgs)	Recovery (ft.)	Blow Count	Odor\Sheen	Moisture\W.L.	Estimated % of Gravel\Sand\Fine	ASTM	Lithologic Unit	Material Descriptions and Remarks	Well Construction/ Comments	Elevation
80	10"		N/N	Sat						80
82									GW-2 (80-85')	82
84										84
86										86
88										88
90										90
92										92
94										94
96										96
98										98
100										100
102										102
104								GRAVEL AND SAND: Fine- to coarse-sized gravel and fine- to coarse-grained sand, nodules of clayey sand, augers very chattery.		104
106					40/40/20	GP/SP				106
108										108
110					0/95/5	SP				110
112	1'	6,15,13,15	N/N	Sat				FINE SAND: Grayish-brown (10YR5/2) very fine- to fine-grained sand, quartz-rich, 20% small platy, black material, trace medium-grained sand, no gravel, trace fines, no laminations, soft.	GW-3 (110-115')	112
114										114
116										116
118										118
120										120
122								POORLY-GRADED SAND: Gray (10YR4/1), very-fine- to coarse-grained sand, subrounded to subangular, quartz/mafic-rich, trace fine-sized gravel, subrounded to subangular, some are polished, trace fines, no laminations, soft.		122
124										124
126										126
128										128
130										130
132										132
134										134
136										136
138										138
140	1.4'		N/N	Sat					GW-4 (140-142.5')	140
142										142
144					5/90/5	SP				144
146										146
148										148
150										150
152										152
154										154
156										156
158										158
160										160
162									Sand pack (45/55)	162
164										164
166										166
168									GW-5 (164-174')	168
170										170
172									2" PVC sch 80, No. slot 10 screen	172
174										174
176								LIMESTONE: Varies from a dark brown to tan, crystalline, no fossils, appears slightly weathered.		176
178										178
180										180

Barr Engineering Company | **Ref. Boring # TP-103** | **Well # TP-103**

Project: MidAmerican Energy Louisa Plant

Project Number:	15/700-001 JSA 200	**Total Drilled Depth:**	175'
Boring Location:	16' west of MW-14	**Ground Surface Elevation (ft):**	577.98
Drilling Contractor:	Bergerson-Caswell	**Depth to Groundwater (ft):**	44.0
Drilling Method:	Hollow-Stem Auger/Mud Rotary	**Riser Elevation:**	580.43
Driller:	Glenn H.	**Date Started:**	7/22/98
Geologist:	Fawna Korhonen	**Date Completed:**	7/23/98
		Unique #:	NA

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Depth (ft. bgs)	Recovery (ft)	Blow Count	Odor\Sheen	Moisture/W.L.	Estimated % of Gravel\Sand\Fine	ASTM	Lithologic Unit	Material Descriptions and Remarks	Well Construction/ Comments	Elevation
0								POORLY-GRADED SAND: Brown (10YR4/6), fine- to medium-grained, trace coarse-grained, subrounded to subangular, quartz-rich, trace fine-sized gravel, trace fines.		
16					10/85/5	SP			2" PVC sch. 80 casing	
30								POORLY-GRADED SAND WITH GRAVEL: Brown (10YR4/3), fine- to coarse-grained, mostly medium-grained, subrounded to subangular, quartz-rich, 30% mafics, 30% fine-sized gravel, subrounded to subangular, basalt, felsic, quartz, no laminations, soft.	Grouted annulus	
38					30/65/5	SP				
40	1.5'	4,5,5,6	N/N	Moist						
44	1' 7"	4,4,6,8	N/N	Wet					▽	
46								POORLY-GRADED SAND WITH GRAVEL: Dark brown (10YR3/5), fine- to coarse-grained sand, subrounded to subangular, quartz/mafic-rich, 30% fine- to medium-sized gravel, subrounded to subangular, polished basalt, quartz.	GW-1 (43-51')	
52					30/65/5	SP				
60								POORLY-GRADED SAND: Grayish-brown (10YR5/2), fine- to coarse-grained sand, subrounded to subangular, quartz-rich, 30% mafics, few carbonates, 10% fine-sized gravel, trace fines, no laminations.		
70	1'	8,10,12,14	N/N	Sat					GW-2 (70-75')	

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Barr Engineering Company

Ref. Boring # TP-103

Well # TP-103

Depth (ft. bgs)	Recovery (ft.)	Blow Count	Odor\Sheen	Moisture\W.L.	Estimated % of Gravel\Sand\Fine	ASTM	Lithologic Unit	Material Descriptions and Remarks	Well Construction/ Comments	Elevation
82					10/85/5	SP				-82
84										-84
86										-86
88										-88
90										-90
92	1'		N/N	Sat					GW-3 (90-95')	-92
94										-94
96										-96
98										-98
100										-100
102										-102
104										-104
106					50/45/5	GP/SP		GRAVEL AND SAND: Fine- to coarse-sized gravel (broken up in auger), subrounded to angular, several pieces of white crystalline limestone with chert, fine- to coarse-grained sand, nodules of clayey sand. Augers very chattery.		-106
108										-108
110										-110
112										-112
114					5/90/5	SP		POORLY-GRADED SAND: Gray (2.5Y4/1), very fine- to coarse-grained sand, very trace fine-sized gravel, no laminations, firm. Piece of gray mudstone in last few inches.		-114
116										-116
118										-118
120										-120
122	1'		N/N	Sat						-122
124					0/15/85	ML/CL		CLAY AND SILT: Gray clayey silt with trace sand, low dilatancy, low plasticity, high dry strength, discrete laminations of silt and clay.		-124
126										-126
128										-128
130										-130
132	1'		N/N	Sat					GW-4 (130-135')	-132
134										-134
136										-136
138										-138
140										-140
142					5/90/5	SP		POORLY-GRADED SAND: Dark gray (10YR4/1) fine- to coarse-grained sand, subrounded to subangular, quartz-rich, 20% mafics, trace fine- to medium-sized gravel, subrounded to subangular, trace fines, no laminations, soft.		-142
144										-144
146										-146
148										-148
150										-150
152	10"		N/N	Sat					GW-5 (150-155')	-152
154										-154
156										-156
158										-158
160										-160
162									Sand pack	-162
164										-164
166										-166
168										-168
170									2" PVC sch. 80, No. 10 slot screen	-170
172								LIMESTONE: Tan to tannish-gray, crystalline, homogenous.		-172
174										-174
176										-176
178										-178
180										-180

Barr Engineering Company | **Ref. Boring # TP-104** | **Well # TP-104**

Project: MidAmerican Energy Louisa Plant

Project Number:	15/700-001 JSA 200	**Total Drilled Depth:**	178'
Boring Location:	136' east, 29' south of EMH-9	**Ground Surface Elevation (ft):**	577.37
Drilling Contractor:	Bergerson-Caswell	**Depth to Groundwater (ft):**	40.5'
Drilling Method:	Hollow-Stem Auger/Mud Rotary	**Riser Elevation:**	579.62
Driller:	Glenn H.	**Date Started:**	7/16/98
Geologist:	Fawna Korhonen	**Date Completed:**	7/20/98
		Unique #:	NA

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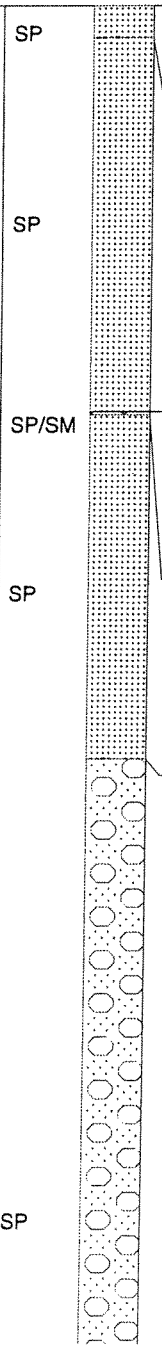
Depth (ft. bgs)	Recovery (ft)	Blow Count	Odor\Sheen	Moisture/W.L.	Estimated % of Gravel\Sand\Fine	ASTM	Lithologic Unit	Material Descriptions and Remarks	Well Construction/ Comments	Elevation
0				Dry	0/95/5	SP		POORLY-GRADED SAND: Dark grayish-brown (10YR4/2), fine- to medium-grained sand, organic-rich	2" PVC sch. 80 casing	576
2										574
4										572
6										570
8										568
10	1' 4"	2,2,2,4	N/N	Moist				POORLY-GRADED SAND: Brown (10YR5/4), mostly fine- to medium-grained sand, some coarse-grained, subrounded to subangular, very trace fine-sized, subrounded to subangular gravel, 5-10% fines, no laminations, soft.		566
12										564
14	1' 7"	2,2,4,5	N/N	Moist	2/88/10	SP				562
16										560
18										558
20	1' 6"	1,1,1,2	N/N	Moist					Annulus sealed with cuttings and grout.	556
22										554
24										552
26	1' 8"	2,2,3,3	N/N	Moist	2/78/20	SP/SM		SILTY FINE SAND: Thin laminations of fine-grained sand and silt in a fine- to coarse-grained sand matrix. Thin laminations of coarse, mafic-richer sand also present.		550
28										548
30	1' 4"	3,6,10,9	N/N	Moist						546
32										544
34										542
36	1' 7"	3,3,4,8	N/N	Moist	10/85/5	SP		POORLY-GRADED SAND: Brown (10YR5/3), fine- to medium-grained sand, subrounded to subangular, quartz-rich, 20% mafics, 5-10% fine-sized gravel, subrounded to subangular, mafic-rich, trace fines, do laminations, soft.	Bentonite chips Sand pack (45/55)	540
38										538
40	1' 7"	4,6,8,10	N/N	M-Wet					▽ GW-1 (47.5-37.5')	536
42										534
44										532
46	1' 6"	4,4,6,6	N/N	Sat					2" PVC sch. 80, No. 10 slot screen	530
48										528
50										526
52										524
54										522
56										520
58										518
60										516
62										514
64										512
66										510
68										508
70										506
72										504
74									GW-2 (70-75')	502
76					40/55/5	SP		POORLY-GRADED SAND WITH GRAVEL: Brown, fine- to coarse-grained sand, 40% fine- to medium-sized gravel, trace fines.		500
78										498
80										496
82										494



Well constructed using hollow-stem auger methods.

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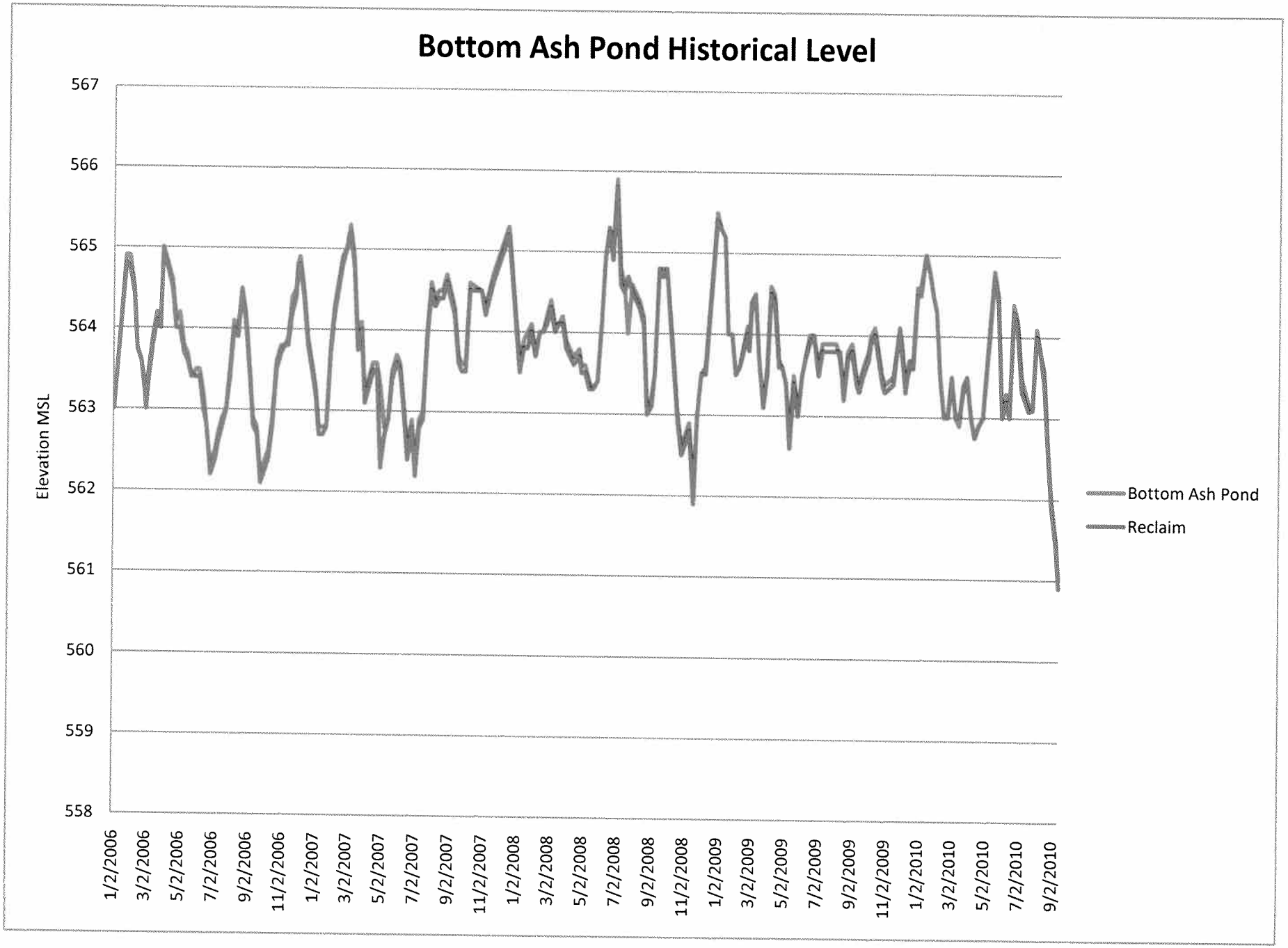
Barr Engineering Company

Ref. Boring # TP-104

Well # TP-104

Depth (ft. bgs)	Recovery (ft.)	Blow Count	Odor\Sheen	Moisture\W.L.	Estimated % of Gravel\Sand\Fine	ASTM	Lithologic Unit	Material Descriptions and Remarks	Well Construction/ Comments	Elevation
96					0/90/10	SP		POORLY-GRADED SAND: Brown, fine- to medium-grained, subrounded to subangular, no gravel, 10% fines.		
100	10"		N/N	Sat						
104								GRAVEL AND SAND: Brown fine- to coarse-sized gravel (broken up in auger), subrounded to angular, fine- to coarse-grained sand, quartz/carbonate-rich, 30% mafics, nodules of clayey sand	GW-3 (100-105')	
106					45/45/10	GP/SP				
116								POORLY-GRADED SAND WITH GRAVEL: Dark brown-gray, fine- to coarse-grained sand, 40% fine- to medium-sized gravel.		
118					40/55/5	SP				
130	10"			Sat				POORLY-GRADED SAND: Dark gray (10YR4/1), very fine- to fine-grained sand, subrounded to subangular, quartz-rich, 10% mafics, no gravel, trace fines.	GW-4 (130-135')	
140					0/90/10	SP				
154					0/30/70	CL/ML		CLAY AND SILT: Gray clayey silt, mud-like consistency, very soft, low elasticity.		
								POORLY-GRADED SAND: Gray fine- to coarse-grained sand, 10% fine gravel.		
166					10/85/5	SP				
174									GW-5 (170-175')	
176								LIMESTONE: Generally a light gray to tan with few diatoms, some fragments of a more crystalline limestone appeared in cuttings.		

1) c)


Bottom Ash Pond Historical Level
Elevation MSL
567
566
565
564
563
562
561
560
559
558
1/2/2006
3/2/2006
5/2/2006
7/2/2006
9/2/2006
11/2/2006
1/2/2007
3/2/2007
5/2/2007
7/2/2007
9/2/2007
11/2/2007
1/2/2008
3/2/2008
5/2/2008
7/2/2008
9/2/2008
11/2/2008
1/2/2009
3/2/2009
5/2/2009
7/2/2009
9/2/2009
11/2/2009
1/2/2010
3/2/2010
5/2/2010
7/2/2010
9/2/2010
Bottom Ash Pond
Reclaim

Ash Pond Inspection Checklist Form – Louisa and Riverside Generating Stations

Circle: Louisa Bottom Ash Pond Louisa CCR Landfill

Riverside Bottom Ash Pond Riverside Temp Ash Area

Inspector's Name: James Wiegand Date: 9-2-10

Answer each question as "Yes" or "No". All "No" answers must be explained below with how the deviation will be remedied.

	Yes	No
Is the top of the dike free of cracks or settlement?	✓	
Is the wall/slope of the dike free of cracks or erosion?		✓
Is the dike free of visible sign of seeps or leaks? Inspect entire slope, inlet and outlet piping, and "boils" from beneath a stream or pond if applicable.	✓	
Are trash-racks clean and in place (LGS bottom ash pond only)?	✓	
Is the CCR landfill free of standing water (LGS CCR landfill only)?	—	—
Is the ash surface free of depressions, sinkholes or whirlpools?	✓	
Is the top or slopes of the dike free of trees and large vegetation (bottom ash ponds only)?	✓	
Are fugitive dust emissions under control?	✓	

Explanation for "No" answers, include expected repairs and work order numbers:

Wash out from previous months still here. W/O 1030815 discussed with Coal Yard Supervisor.

Other comments: No Comments

Inspector signature: James Wiegand

Louisa environmental file 3.1.1.6 or Riverside environmental file 1.9.2

Rev JDW 12-4-09

Ash Pond Inspection Checklist Form – Louisa and Riverside Generating Stations

Circle: Louisa Bottom Ash Pond — Louisa CCR Landfill

Riverside Bottom Ash Pond — Riverside Temp Ash Area

Inspector's Name: James Wiegand — Date: 8-2-10

Answer each question as "Yes" or "No". All "No" answers must be explained below with how the deviation will be remedied.

	Yes	No
Is the top of the dike free of cracks or settlement?	✓	
Is the wall/slope of the dike free of cracks or erosion?		✓
Is the dike free of visible sign of seeps or leaks? Inspect entire slope, inlet and outlet piping, and "boils" from beneath a stream or pond if applicable.	✓	
Are trash-racks clean and in place (LGS bottom ash pond only)?	✓	
Is the CCR landfill free of standing water (LGS CCR landfill only)?	—	
Is the ash surface free of depressions, sinkholes or whirlpools?	✓	
Is the top or slopes of the dike free of trees and large vegetation (bottom ash ponds only)?	✓	
Are fugitive dust emissions under control?	✓	

Explanation for "No" answers, include expected repairs and work order numbers:

Weeds are cut and trees removed.

Washout areas along North side of east fence next to reclaim pond. Work order 1030815 submitted.

Other comments: No comments

Inspector signature: James Wiegand

Louisa environmental file 3.1.1.6 or Riverside environmental file 1.9.2

Rev JDW 12-4-09

Ash Pond Inspection Checklist Form – Louisa and Riverside Generating Stations

Circle: Louisa Bottom Ash Pond Louisa CCR Landfill

Riverside Bottom Ash Pond Riverside Temp Ash Area

Inspector's Name: James Wiegand Date: 7-1-10

Answer each question as "Yes" or "No". All "No" answers must be explained below with how the deviation will be remedied.

	Yes	No
Is the top of the dike free of cracks or settlement?	✓	
Is the wall/slope of the dike free of cracks or erosion?	✓	
Is the dike free of visible sign of seeps or leaks? Inspect entire slope, inlet and outlet piping, and "boils" from beneath a stream or pond if applicable.	✓	
Are trash-racks clean and in place (LGS bottom ash pond only)?	✓	
Is the CCR landfill free of standing water (LGS CCR landfill only)?	—	—
Is the ash surface free of depressions, sinkholes or whirlpools?	✓	
Is the top or slopes of the dike free of trees and large vegetation (bottom ash ponds only)?		✓
Are fugitive dust emissions under control?	✓	

Explanation for "No" answers, include expected repairs and work order numbers:

Weeds are sprayed, some large dead weeds need to be mowed.
Washout on east fence needs repaired. W/O 1026377 submitted.
Large trees near outfall 004 need removed. Will be added to weed sprayer scope of work.

Other comments: Both ash lines are leaking within pond. W/O 1026376 submitted

Inspector signature: James Wiegand

Louisa environmental file 3.1.1.6 or Riverside environmental file 1.9.2

Rev JDW 12-4-09

Ash Pond Inspection Checklist Form – Louisa and Riverside Generating Stations

Circle: Louisa Bottom Ash Pond — Louisa CCR Landfill

Riverside Bottom Ash Pond — Riverside Temp Ash Area

Inspector's Name: James Wiegand Date: 6-1-10

Answer each question as "Yes" or "No". All "No" answers must be explained below with how the deviation will be remedied.

	Yes	No
Is the top of the dike free of cracks or settlement?	✓	
Is the wall/slope of the dike free of cracks or erosion?	✓	
Is the dike free of visible sign of seeps or leaks? Inspect entire slope, inlet and outlet piping, and "boils" from beneath a stream or pond if applicable.	✓	
Are trash-racks clean and in place (LGS bottom ash pond only)?	✓	
Is the CCR landfill free of standing water (LGS CCR landfill only)?	—	
Is the ash surface free of depressions, sinkholes or whirlpools?	✓	
Is the top or slopes of the dike free of trees and large vegetation (bottom ash ponds only)?		✓
Are fugitive dust emissions under control?	✓	

Explanation for "No" answers, include expected repairs and work order numbers:

Weeds + trees need to be removed per previous w/o 1018086.

Other comments: No Comments

Inspector signature: James Wiegand

Louisa environmental file 3.1.1.6 or Riverside environmental file 1.9.2

Rev JDW 12-4-09

Ash Pond Inspection Checklist Form – Louisa and Riverside Generating Stations

Circle: Louisa Bottom Ash Pond

Riverside Bottom Ash Pond

Louisa CCR Landfill

Riverside Temp Ash Area

Inspector's Name: James Wiegand

Date: 5-3-10

Answer each question as "Yes" or "No". All "No" answers must be explained below with how the deviation will be remedied.

	Yes	No
Is the top of the dike free of cracks or settlement?	✓	
Is the wall/slope of the dike free of cracks or erosion?	✓	
Is the dike free of visible sign of seeps or leaks? Inspect entire slope, inlet and outlet piping, and "boils" from beneath a stream or pond if applicable.	✓	
Are trash-racks clean and in place (LGS bottom ash pond only)?	✓	
Is the CCR landfill free of standing water (LGS CCR landfill only)?	—	—
Is the ash surface free of depressions, sinkholes or whirlpools?	✓	
Is the top or slopes of the dike free of trees and large vegetation (bottom ash ponds only)?		✓
Are fugitive dust emissions under control?	✓	

Explanation for "No" answers, include expected repairs and work order numbers:

Weeds need to be removed. Work order 1018086 submitted.

Other comments: _____

Inspector signature: James Wiegand

Louisa environmental file 3.1.1.6 or Riverside environmental file 1.9.2

Rev JDW 12-4-09

Ash Pond Inspection Checklist Form – Louisa and Riverside Generating Stations

Circle: Louisa Bottom Ash Pond — Louisa CCR Landfill

Riverside Bottom Ash Pond — Riverside Temp Ash Area

Inspector's Name: James Wiegand Date: 4-1-10

Answer each question as "Yes" or "No". All "No" answers must be explained below with how the deviation will be remedied.

	Yes	No
Is the top of the dike free of cracks or settlement?	✓	
Is the wall/slope of the dike free of cracks or erosion?	✓	
Is the dike free of visible sign of seeps or leaks? Inspect entire slope, inlet and outlet piping, and "boils" from beneath a stream or pond if applicable.	✓	
Are trash-racks clean and in place (LGS bottom ash pond only)?	✓	
Is the CCR landfill free of standing water (LGS CCR landfill only)?	—	—
Is the ash surface free of depressions, sinkholes or whirlpools?	✓	
Is the top or slopes of the dike free of trees and large vegetation (bottom ash ponds only)?		✓
Are fugitive dust emissions under control?	✓	

Explanation for "No" answers, include expected repairs and work order numbers:

Large weeds on south side need removed during weed spraying later in year.

Other comments: No comments

Inspector signature: James Wiegand

Louisa environmental file 3.1.1.6 or Riverside environmental file 1.9.2

Rev JDW 12-4-09

Ash Pond Inspection Checklist Form – Louisa and Riverside Generating Stations

Circle: Louisa Bottom Ash Pond Louisa CCR Landfill

Riverside Bottom Ash Pond Riverside Temp Ash Area

Inspector's Name: James Wiegand Date: 3-2-10

Answer each question as "Yes" or "No". All "No" answers must be explained below with how the deviation will be remedied.

	Yes	No
Is the top of the dike free of cracks or settlement?	✓	
Is the wall/slope of the dike free of cracks or erosion?	✓	
Is the dike free of visible sign of seeps or leaks? Inspect entire slope, inlet and outlet piping, and "boils" from beneath a stream or pond if applicable.	✓	
Are trash-racks clean and in place (LGS bottom ash pond only)?	✓	
Is the CCR landfill free of standing water (LGS CCR landfill only)?	—	—
Is the ash surface free of depressions, sinkholes or whirlpools?	✓	
Is the top or slopes of the dike free of trees and large vegetation (bottom ash ponds only)?		✓
Are fugitive dust emissions under control?	✓	

Explanation for "No" answers, include expected repairs and work order numbers:

Weeds to be removed in spring.

Other comments: _____

Inspector signature: James Wiegand

Louisa environmental file 3.1.1.6 or Riverside environmental file 1.9.2

Rev JDW 12-4-09

Ash Pond Inspection Checklist Form – Louisa and Riverside Generating Stations

Circle: Louisa Bottom Ash Pond

Riverside Bottom Ash Pond

Louisa CCR Landfill

Riverside Temp Ash Area

Inspector's Name: James Wiegand

Date: 2-3-10

Answer each question as "Yes" or "No". All "No" answers must be explained below with how the deviation will be remedied.

	Yes	No
Is the top of the dike free of cracks or settlement?	✓	
Is the wall/slope of the dike free of cracks or erosion?	✓	
Is the dike free of visible sign of seeps or leaks? Inspect entire slope, inlet and outlet piping, and "boils" from beneath a stream or pond if applicable.	✓	
Are trash-racks clean and in place (LGS bottom ash pond only)?	✓	
Is the CCR landfill free of standing water (LGS CCR landfill only)?	—	—
Is the ash surface free of depressions, sinkholes or whirlpools?	✓	
Is the top or slopes of the dike free of trees and large vegetation (bottom ash ponds only)?		✓
Are fugitive dust emissions under control?	✓	

Explanation for "No" answers, include expected repairs and work order numbers:

Large weeds on south slope need to be removed in spring

Other comments: No comments

Inspector signature: James Wiegand

Louisa environmental file 3.1.1.6 or Riverside environmental file 1.9.2

Rev JDW 12-4-09

Ash Pond Inspection Checklist Form – Louisa and Riverside Generating Stations

Circle: Louisa Bottom Ash Pond

Riverside Bottom Ash Pond

Louisa CCR Landfill

Riverside Temp Ash Area

Inspector's Name: James Wiegand

Date: 1-11-10

Answer each question as "Yes" or "No". All "No" answers must be explained below with how the deviation will be remedied.

	Yes	No
Is the top of the dike free of cracks or settlement?	✓	
Is the wall/slope of the dike free of cracks or erosion?	Snow Covered	
Is the dike free of visible sign of seeps or leaks? Inspect entire slope, inlet and outlet piping, and "boils" from beneath a stream or pond if applicable.	OK but snow covered	
Are trash-racks clean and in place (LGS bottom ash pond only)?	✓	
Is the CCR landfill free of standing water (LGS CCR landfill only)?	—	
Is the ash surface free of depressions, sinkholes or whirlpools?	Snow Covered	
Is the top or slopes of the dike free of trees and large vegetation (bottom ash ponds only)?	✓	
Are fugitive dust emissions under control?	✓	

Explanation for "No" answers, include expected repairs and work order numbers:

Weeds need to be mowed in Spring.
Pond & walls are snow covered.

Other comments: No Comments

Inspector signature: James Wiegand

Louisa environmental file 3.1.1.6 or Riverside environmental file 1.9.2

Rev JDW 12-4-09

Ash Pond Inspection Checklist Form – Louisa and Riverside Generating Stations

Circle: Louisa Bottom Ash Pond — Louisa CCR Landfill

Riverside Bottom Ash Pond — Riverside Temp Ash Area

Inspector's Name: James Wiegand — Date: 12-1-09 (SW)

Answer each question as "Yes" or "No". All "No" answers must be explained below with how the deviation will be remedied.

	Yes	No
Is the top of the dike free of cracks or settlement?		✓
Is the wall/slope of the dike free of cracks or erosion?	✓	
Is the dike free of visible sign of seeps or leaks? Inspect entire slope, inlet and outlet piping, and "boils" from beneath a stream or pond if applicable.	✓	
Are trash-racks clean and in place (LGS bottom ash pond only)?	✓	
Is the ash surface free of depressions, sinkholes or whirlpools?	✓	
Is the top or slopes of the dike free of trees and large vegetation (bottom ash ponds only)?	✓	
Are fugitive dust emissions under control?	✓	

Explanation for "No" answers, include expected repairs and work order numbers:

Significant depression on SW corner of main pond. Work order 0944078 submitted.

Other comments: No Comments

Inspector signature: James W.

Louisa environmental file 3.1.1.6 or Riverside environmental file 1.9.2

Rev JDW 7-2-09

Ash Pond Inspection Checklist Form – Louisa and Riverside Generating Stations

Circle: Louisa Bottom Ash Pond Louisa CCR Landfill

Riverside Bottom Ash Pond Riverside Temp Ash Area

Inspector's Name: James Wiegand Date: 11-4-09

Answer each question as "Yes" or "No". All "No" answers must be explained below with how the deviation will be remedied.

	Yes	No
Is the top of the dike free of cracks or settlement?	✓	
Is the wall/slope of the dike free of cracks or erosion?	✓	
Is the dike free of visible sign of seeps or leaks? Inspect entire slope, inlet and outlet piping, and "boils" from beneath a stream or pond if applicable.	✓	
Are trash-racks clean and in place (LGS bottom ash pond only)?	✓	
Is the ash surface free of depressions, sinkholes or whirlpools?	✓	
Is the top or slopes of the dike free of trees and large vegetation (bottom ash ponds only)?	~~✓~~	✓
Are fugitive dust emissions under control?	✓	

Explanation for "No" answers, include expected repairs and work order numbers:

Trees + weeds are dead, need to be removed in spring.

Other comments: No Comments

Inspector signature: James Wiegand

Louisa environmental file 3.1.1.6 or Riverside environmental file 1.9.2

Rev JDW 7-2-09

Ash Pond Inspection Checklist Form – Louisa and Riverside Generating Stations

Circle: Louisa Bottom Ash Pond — Louisa CCR Landfill

Riverside Bottom Ash Pond — Riverside Temp Ash Area

Inspector's Name: James Wiegand Date: 10-21-09

Answer each question as "Yes" or "No". All "No" answers must be explained below with how the deviation will be remedied.

	Yes	No
Is the top of the dike free of cracks or settlement?	✓	
Is the wall/slope of the dike free of cracks or erosion?	✓	
Is the dike free of visible sign of seeps or leaks? Inspect entire slope, inlet and outlet piping, and "boils" from beneath a stream or pond if applicable.	✓	
Are trash-racks clean and in place (LGS bottom ash pond only)?	✓	
Is the ash surface free of depressions, sinkholes or whirlpools?	✓	
Is the top or slopes of the dike free of trees and large vegetation (bottom ash ponds only)?	✓	
Are fugitive dust emissions under control?	✓	

Explanation for "No" answers, include expected repairs and work order numbers:

The oil boom is nearly sinking. Lab was contacted to replace boom.

Other comments: No Comments

Inspector signature: James Wiegand

Louisa environmental file 3.1.1.6 or Riverside environmental file 1.9.2

Rev JDW 7-2-09

Ash Pond Inspection Checklist Form – Louisa and Riverside Generating Stations

Circle: Louisa Bottom Ash Pond — Louisa CCR Landfill

Riverside Bottom Ash Pond — Riverside Temp Ash Area

Inspector's Name: James Wiegand (JW) Date: 9-2-09

Answer each question as "Yes" or "No". All "No" answers must be explained below with how the deviation will be remedied.

	Yes	No
Is the top of the dike free of cracks or settlement?	✓	
Is the wall/slope of the dike free of cracks or erosion?	✓	
Is the dike free of visible sign of seeps or leaks? Inspect entire slope, inlet and outlet piping, and "boils" from beneath a stream or pond if applicable.	✓	
Are trash-racks clean and in place (LGS bottom ash pond only)?	✓	
Is the ash surface free of depressions, sinkholes or whirlpools?	✓	
Is the top or slopes of the dike free of trees and large vegetation (bottom ash ponds only)?		✓
Are fugitive dust emissions under control?	✓	

Explanation for "No" answers, include expected repairs and work order numbers:

Weeds recently sprayed.
Oil boom needs to be replaced

Other comments: No comments

Inspector signature: James W

Louisa environmental file 3.1.1.6 or Riverside environmental file 1.9.2

Rev JDW 7-2-09

Ash Pond Inspection Checklist Form – Louisa and Riverside Generating Stations

Circle: Louisa Bottom Ash Pond Louisa CCR Landfill

Riverside Bottom Ash Pond Riverside Temp Ash Area

Inspector's Name: James Wigand Date: 8-3-09

Answer each question as "Yes" or "No". All "No" answers must be explained below with how the deviation will be remedied.

	Yes	No
Is the top of the dike free of cracks or settlement?	✓	
Is the wall/slope of the dike free of cracks or erosion?	✓	
Is the dike free of visible sign of seeps or leaks? Inspect entire slope, inlet and outlet piping, and "boils" from beneath a stream or pond if applicable.	✓	
Are trash-racks clean and in place (LGS bottom ash pond only)?	✓	
Is the ash surface free of depressions, sinkholes or whirlpools?	✓	
Is the top or slopes of the dike free of trees and large vegetation (bottom ash ponds only)?		✓
Are fugitive dust emissions under control?	✓	

Explanation for "No" answers, include expected repairs and work order numbers:

See previous inspection, Wright Tree Service scheduled this week to complete weed/tree control

Other comments: _____

Inspector signature: James Wigand

Louisa environmental file 3.1.1.6 or Riverside environmental file 1.9.2

Rev JDW 7-2-09

Ash Pond Inspection Checklist Form – Louisa and Riverside Generating Stations

Circle: Louisa Bottom Ash Pond — Louisa CCR Landfill

Riverside Bottom Ash Pond — Riverside Temp Ash Area

Inspector's Name: James Wiegand Date: 7-2-09

Answer each question as "Yes" or "No". All "No" answers must be explained below with how the deviation will be remedied.

	Yes	No
Is the top of the dike free of cracks or settlement?		✓
Is the wall/slope of the dike free of cracks or erosion?		✓
Is the dike free of visible sign of seeps or leaks? Inspect entire slope, inlet and outlet piping, and "boils" from beneath a stream or pond if applicable.	✓	
Are trash-racks clean and in place (LGS bottom ash pond only)?	✓	
Is the ash surface free of depressions, sinkholes or whirlpools?	✓	
Is the top or slopes of the dike free of trees and large vegetation (bottom ash ponds only)?		✓
Are fugitive dust emissions under control?	✓	

Explanation for "No" answers, include expected repairs and work order numbers:

All previously found, still work ordered. Tree on east wall of bottom ash pond needs to be added.

Other comments: No Comments

Inspector signature: James Wiegand

Louisa environmental file 3.1.1.6 or Riverside environmental file 1.9.2

Rev JDW 7-2-09

Ash Pond Inspection Checklist Form – Louisa and Riverside Generating Stations

Circle: Louisa Bottom Ash Pond | Louisa CCR Landfill

Riverside Bottom Ash Pond | Riverside Temp Ash Area

Inspector's Name: James Wiegand Date: 6-10-09

Answer each question as "Yes" or "No". All "No" answers must be explained below with how the deviation will be remedied.

	Yes	No
Is the top of the dike free of cracks or settlement?		✓
Is the wall/slope of the dike free of cracks or erosion?		✓
Is the dike free of visible sign of seeps or leaks? Inspect entire slope, inlet and outlet piping, and "boils" from beneath a stream or pond if applicable.	✓	
Are trash-racks clean and in place (LGS bottom ash pond only)?	✓	
Is the ash surface free of depressions, sinkholes or whirlpools?	✓	
Is the top or slopes of the dike free of trees and large vegetation?		✓
Are fugitive dust emissions under control?	✓	

Explanation for "No" answers, include expected repairs and work order numbers:

Various washouts and road settlement - work order 0920929

Weed along south wall need removed - work order 0920931

Other comments: _____

Inspector signature: James Wieg

Louisa environmental file 3.1.1.6 or Riverside environmental file 1.9.2

Rev JDW 6-10-09

MidAmerican ENERGY

MEMORANDUM

Rec'd 3-1-99 DHH

November 5, 1998

Subject: Modifications to the Louisa NPDES Permit

To: Dick Arnold

From: Robin Fortney

Introduction

Attached is the new NPDES permit for Louisa Generating Station. Earlier in the year, we requested the following revisions to the permit:

- Reduced monitoring for chromium and zinc at Outfall 001;
- Deletion of coal pile monitoring requirements for Outfall 002; and
- Reinstated limitations for the ash pond discharge.

We negotiated the following final revisions:

- Annual monitoring for chromium and zinc at Outfall 001;
- Reinstatement of limitations for the final ash pond discharge; and
- New Outfall 004 designated for coal pile runoff into the ash pond.

Action Plan

1. Review the new permit carefully. Replace pages 2 through 10 of the current permit with the new pages.

2. Monitor both chromium and zinc at Outfall 001 on an annual basis. I suggest that you schedule this monitoring for the same week each year.

3. Monitor Outfall 002 for storm water on an annual basis, preferably early in the year.

4. Start monitoring the new Outfall 004. You must monitor the coal pile runoff on a monthly basis. I recommend you do it on a wet day whenever possible. If there is no flow, note that on the monthly monitoring report. If there is discharge, then grab a sample.

Please contact me at x-2951 if you have any questions.

Cc: Cathy Woollums
Chuck Spooner
Bill Whitney
Donn Bauerly

STATE OF IOWA
TERRY E. BRANSTAD, GOVERNOR
DEPARTMENT OF NATURAL RESOURCES
LARRY J. WILSON, DIRECTOR

October 20, 1997

MidAmerican Energy Company
666 Grand Avenue, P.O. Box 657
Des Moines, Iowa 50303-0657

SUBJECT: Permit Amendment - NPDES permit # 58-00-1-05

Attention: Robin B. Fortney

We are herewith forwarding one copy of an amendment to the permit referenced above which was issued May 22, 1998.

Your NPDES permit is being amended due to changes in Outfall Description and monitoring requirements as follows:

Outfall # 001:
Per your request, the department has approved a variance to reduce monitoring requirements for Chromium (t), and Zinc (t) from monthly to annually, and from semi-annually to annually, respectively.

Outfall 002:
Outfall description will be revised to delete the discharge of coal pile runoff.

Outfall # 004:
This Outfall (# 004) will be added to allow final effluent limitations and monitoring requirements from the final effluent of coal pile runoff.

If you have any questions or comments regarding this amendment, please contact Mohammed Shams at (515)281-4216.

Sincerely,

WAYNE FARRAND, SUPERVISOR
WASTEWATER SECTION

STATE OF IOWA
DEPARTMENT OF NATURAL RESOURCES
ENVIRONMENTAL PROTECTION
AMENDMENT TO NPDES PERMIT

Iowa NPDES Permit No.:	58-00-1-05
Date of Issuance:	05-22-1998
Date of Expiration:	05-21-2003
Date of this Amendment:	10-20-1998
EPA NUMBER:	IA0063282

Name and Mailing Address of Applicant:

MidAmerican Energy Company
666 Grand Avenue
P.O. Box 657
Des Moines, Iowa 50303-0657

Identify and Location of Facility:

MidAmerican Energy Co. - Louisa Station
Section 3, T-75 N, R-2 W, Louisa County, Iowa

Pursuant to the authority Iowa Code Section 455B.174, and of Rule 567--64.3, Iowa Administrative Code, the Director of the Iowa Department of Natural Resources has issued the above referenced permit. Pursuant to the same authority the Director hereby amends said permit as set forth below:

The description of Outfall #002 shall be revised to delete the discharge of coal pile runoff and Outfall #004 shall be added to allow discharge from this wastewater discharge.

Monitoring frequencies for Chromium (t), and Zinc (t) shall be reduced from monthly to annually, and from semi-annually to annually, respectively.

Page 2 through page 10 shall be replaced with the attached replacement pages.

For the Department of Natural Resources:

LARRY J WILSON, DIRECTOR

By: _____
Wayne Farrand, Supervisor
Wastewater Section
Environmental Protection Division

Outfall Number	Description
001	COOLING TOWER BLOWDOWN.
002	OVERFLOW FROM BOTTOM ASH SETTLING POND WHICH RECEIVES WATER FROM, COOLING TOWER, METAL CLEANING, YARD AND ROOF DRAINS, ASH SLUICE WATER & DEMINERALIZER WASTES.
003	DISCHARGE FROM EXTENDED AERATION PACKAGE SYSTEM FOR TREATING DOMESTIC SEWAGE BEFORE MIXING WITH OTHER WASTESTREAMS.
004	COAL PILE RUNOFF (STORMWATER).

Facility Name: MIDAMERICAN ENERGY COMPANY-LOUISA STATION

Effluent Limitations

Permit Number: 5800105

OUTFALL NO.: 001 COOLING TOWER BLOWDOWN.

You are prohibited from discharging pollutants except in compliance with the following effluent limitations:

Wastewater Parameter	Season	Type	EFFLUENT LIMITATIONS							
			Concentration				Mass			
			7 Day Average	30 Day Average	Daily Maximum	Units	7 Day Average	30 Day Average	Daily Maximum	Units
FLOW	YEARLY	FINAL		1.2000	1.5000	MGD				
PH (MINIMUM - MAXIMUM)	YEARLY	FINAL	6.0000		9.0000	STD UNITS				
CHLORINE,FREE AVAILABLE	YEARLY	FINAL		.2000	.5000	MG/L				
CHROMIUM,TOTAL (AS CR)	YEARLY	FINAL			.2000	MG/L				
ZINC,TOTAL (AS ZN)	YEARLY	FINAL			1.0000	MG/L				

NOTE: If seasonal limits apply, summer is from April 1 through October 31, and winter is from November 1 through March 31.

Facility Name: MIDAMERICAN ENERGY COMPANY-LOUISA STATION

Permit Number: 5800105

Effluent Limitations

OUTFALL NO.: 002 OVERFLOW FROM BOTTOM ASH SETTLING POND WHICH RECEIVES WATER FROM, COOLING TOWER, METAL CLEANING, YARD AND R

You are prohibited from discharging pollutants except in compliance with the following effluent limitations:

Wastewater Parameter	Season	Type	EFFLUENT LIMITATIONS							
			Concentration				Mass			
			7 Day Average	30 Day Average	Daily Maximum	Units	7 Day Average	30 Day Average	Daily Maximum	Units
FLOW	YEARLY	FINAL		1.6500	2.2200	MGD				
TOTAL SUSPENDED SOLIDS	YEARLY	FINAL		30.0000	100.0000	MG/L				
PH (MINIMUM - MAXIMUM)	YEARLY	FINAL	6.0000		9.0000	STD UNITS				
COLIFORM,FECAL	YEARLY	FINAL			200.0000	#/100 ML				
COPPER,TOTAL (AS CU)	YEARLY	FINAL			.2200	MG/L			3.00	LBS/DAY
IRON,TOTAL (AS FE)	YEARLY	FINAL			.2200	MG/L			3.00	LBS/DAY
OIL AND GREASE	YEARLY	FINAL		15.0000	20.0000	MG/L				

NOTE: If seasonal limits apply, summer is from April 1 through October 31, and winter is from November 1 through March 31.

Facility Name: MIDAMERICAN ENERGY COMPANY-LOUISA STATION

Effluent Limitations

Permit Number: 5800105

OUTFALL NO.: 003 DISCHARGE FROM EXTENDED AERATION PACKAGE SYSTEM FOR TREATING DOMESTIC SEWAGE BEFORE MIXING WITH OTHER WASTE

You are prohibited from discharging pollutants except in compliance with the following effluent limitations:

			EFFLUENT LIMITATIONS							
			Concentration				Mass			
Wastewater Parameter	Season	Type	7 Day Average	30 Day Average	Daily Maximum	Units	7 Day Average	30 Day Average	Daily Maximum	Units
CBOD5	YEARLY	FINAL	40.0000	25.0000		MG/L				
TOTAL SUSPENDED SOLIDS	YEARLY	FINAL	45.0000	30.0000		MG/L				

NOTE: If seasonal limits apply, summer is from April 1 through October 31, and winter is from November 1 through March 31.

Facility Name: MIDAMERICAN ENERGY COMPANY-LOUISA STATION

Effluent Limitations

Permit Number: 5800105

OUTFALL NO.: 004 COAL PILE RUNOFF (STORMWATER).

You are prohibited from discharging pollutants except in compliance with the following effluent limitations:

Wastewater Parameter	Season	Type	EFFLUENT LIMITATIONS							
			Concentration				Mass			
			7 Day Average	30 Day Average	Daily Maximum	Units	7 Day Average	30 Day Average	Daily Maximum	Units
TOTAL SUSPENDED SOLIDS	YEARLY	FINAL			50.0000	MG/L				
PH (MINIMUM - MAXIMUM)	YEARLY	FINAL	6.0000		9.0000	STD UNITS				

NOTE: If seasonal limits apply, summer is from April 1 through October 31, and winter is from November 1 through March 31.

Facility Name: MIDAMERICAN ENERGY COMPANY-LOUISA STATION

Non-Standard Effluent Limitations

Permit Number: 5800105

OUTFALL NO.: 001 COOLING TOWER BLOWDOWN.

Wastewater Parameter	Non-Standard Limits
CHLORINE,FREE AVAILABLE	NEITHER FREE AVAILABLE CHLORINE (FAC) NOR TOTAL RESIDUAL CHLORINE (TRC) MAY BE DISCHARGED FROM ANY UNIT FOR MORE THAN TWO HOURS IN ANY ONE DAY AND NOT MORE THAN ONE UNIT IN ANY PLANT MAY DISCHARGE FREE AVAILABLE CHLORINE OR TOTAL RESIDUAL CHLORINE AT ANY ONE TIME.

Monitoring and Reporting Requirements

(a) Samples and measurements taken shall be representative of the volume and nature of the monitored wastewater.

(b) Analytical and sampling methods as specified in 40 CFR Part 136 or other methods approved in writing by the department, shall be utilized.

(c) Chapter 63 of the rules provides you with further explanation of your monitoring requirements.

(d) You are required to report all data including calculated results needed to determine compliance with the limitations contained in this permit. This includes daily maximums and minimums, 30-day averages and 7-day averages for all parameters that have concentration (mg/l) and mass (lbs/day) limits. Also, flow data shall be reported in million gallons per day (MGD).

(e) Results of all monitoring shall be recorded on forms provided by the department, and submitted to the department by the fifteenth day following the close of the reporting period. Your reporting period is on a monthly basis, ending on the last day of each month.

Outfall Number	Wastewater Parameter	Sample Frequency	Sample Type	Monitoring Location
001	FLOW	7/WEEK	24 HR TOTAL	FINAL EFFLUENT
001	PH (MINIMUM - MAXIMUM)	1/WEEK	GRAB	FINAL EFFLUENT
001	CHLORINE,FREE AVAILABLE	1/2 WEEKS	GRAB	COOLING TOWER BLOWDOWN PRIOR TO MIXING WITH OTHER WASTESTREAMS
001	CHROMIUM,TOTAL (AS CR)	1/12 MONTHS	GRAB	COOLING TOWER BLOWDOWN PRIOR TO MIXING WITH OTHER WASTESTREAMS
001	TEMPERATURE	7/WEEK	GRAB	FINAL EFFLUENT
001	ZINC,TOTAL (AS ZN)	1/12 MONTHS	GRAB	COOLING TOWER BLOWDOWN PRIOR TO MIXING WITH OTHER W ASTESTREAMS
001	DURATION OF CHLORINE DISCHARGE	7/WEEK	MEASUREMENT	MONTHLY REPORT
002	FLOW	7/WEEK	24 HR TOTAL	FINAL EFFLUENT
002	TOTAL SUSPENDED SOLIDS	1/MONTH	GRAB	FINAL EFFLUENT
002	PH (MINIMUM - MAXIMUM)	1/WEEK	GRAB	FINAL EFFLUENT
002	COLIFORM,FECAL	1/3 MONTH	GRAB	FINAL EFFLUENT
002	COPPER,TOTAL (AS CU)	1/MONTH	GRAB	FINAL WHEN METAL CLEANING WASTES ARE DISCHARGED
002	IRON,TOTAL (AS FE)	1/MONTH	GRAB	FINAL WHEN METAL CLEANING WASTES ARE DISCHARGED
002	OIL AND GREASE	1/MONTH	GRAB	FINAL EFFLUENT
002	STORMWATER	1/12 MONTHS	24 HR COMP	FINAL EFFLUENT
003	CBOD5	1/3 MONTH	24 HR COMP	EFFLUENT FROM ACTIVATED SLUDGE PLANT PRIOR TO DISCHARG E INTO THE BOTTOM ASH POND
003	TOTAL SUSPENDED SOLIDS	1/3 MONTH	24 HR COMP	EFFLUENT FROM ACTIVATED SLUDGE PLANT PRIOR TO DISCHARG E INTO THE BOTTOM ASH POND
003	PH (MINIMUM - MAXIMUM)	1/3 MONTH	GRAB	EFFLUENT FROM ACTIVATED SLUDGE PLANT PRIOR TO DISCHARG E INTO THE BOTTOM ASH POND
003	DISSOLVED OXYGEN (MINIMUM)	1/WEEK	GRAB	AERATION BASIN CONTENTS
003	SOLIDS,MIXED LIQUOR SUSPENDED	1/MONTH	GRAB	AERATION BASIN CONTENTS
003	TEMPERATURE	1/MONTH	GRAB	AERATION BASIN CONTENTS

Facility Name: MIDAMERICAN ENERGY COMPANY-LOUISA STATION

Permit Number: 5800105

Monitoring and Reporting Requirements

(a) Samples and measurements taken shall be representative of the volume and nature of the monitored wastewater.

(b) Analytical and sampling methods as specified in 40 CFR Part 136 or other methods approved in writing by the department, shall be utilized.

(c) Chapter 63 of the rules provides you with further explanation of your monitoring requirements.

(d) You are required to report all data including calculated results needed to determine compliance with the limitations contained in this permit. This includes daily maximums and minimums, 30-day averages and 7-day averages for all parameters that have concentration (mg/l) and mass (lbs/day) limits. Also, flow data shall be reported in million gallons per day (MGD).

(e) Results of all monitoring shall be recorded on forms provided by the department, and submitted to the department by the fifteenth day following the close of the reporting period. Your reporting period is on a monthly basis, ending on the last day of each month.

Outfall Number	Wastewater Parameter	Sample Frequency	Sample Type	Monitoring Location
003	30-MINUTE SETTLEABILITY	1/MONTH	GRAB	AERATION BASIN CONTENTS
004	TOTAL SUSPENDED SOLIDS	1/MONTH	GRAB	EFFLUENT PRIOR TO DISCHARGE TO THE ASH POND
004	PH (MINIMUM - MAXIMUM)	1/MONTH	GRAB	EFFLUENT PRIOR TO DISCHARGE TO THE ASH POND

Permit Number: 5800105

Special Monitoring Requirements

Outfall Number	Description
001	CHROMIUM,TOTAL (AS CR) MONITORING SHALL BE CONDUCTED ONLY DURING PERIOD OF DISCHARGE.
001	ZINC,TOTAL (AS ZN) MONITORING SHALL BE CONDUCTED ONLY DURING PERIOD OF DISCHARGE.

STORM WATER DISCHARGE REQUIREMENTS

PART I. COVERAGE UNDER THIS PERMIT

A. Eligibility. These conditions cover all existing discharges composed in whole or in part of stormwater associated with industrial activity as defined in Part V of this permit.

B. Limitations on Coverage. The following storm water discharges associated with industrial activity are NOT covered by these conditions but may be covered by conditions specified elsewhere in this permit:

1. storm water discharges associated with industrial activity subject to an existing effluent guideline limitation for storm water. For the purpose of this permit, the following effluent guideline limitations address storm water: cement manufacturing (40 CFR 411); feedlots (40 CFR 412); fertilizer manufacturing (40 CFR 418); petroleum refining (40 CFR 419); phosphate manufacturing (40 CFR 422); steam electric (coal pile runoff) (40 CFR 423); coal mining (40 CFR 434); mineral mining and processing (40 CFR 436); ore mining and dressing (40 CFR 440); and asphalt emulsion (40 CFR 443).

2. storm water discharges associated with industrial activity from construction activities, except storm water discharges from asphalt plants, concrete plants, and sand and/or gravel operations; and,

3. storm water discharges associated with industrial activity that the Department has shown to be or may reasonably be expected to be contributing to a violation of a water quality standard.

C. Exclusions. Discharges of storm water runoff from mining operations or oil and gas exploration, production, processing, or treatment operations or transmission facilities, composed entirely of flows which are from conveyances or systems of conveyances used for collecting and conveying precipitation runoff and which are not contaminated by contact with, or do not come in contact with, any overburden, raw material, intermediate products, finished products, byproduct, or waste products located on the site of such operations.

PART II. SPECIAL CONDITIONS, MANAGEMENT PRACTICES, AND OTHER NON—NUMERIC LIMITATIONS

A. Releases in Excess of Reportable Quantities. Any owner or operator identified in the pollution prevention plan is subject to the spill notification requirements as specified in 455B.386 of the Iowa Code. Iowa law requires that as soon as possible but not less than six hours after the onset of a "hazardous condition" the Department and local sheriff's office or the office of the sheriff of the affected county be notified.

The storm water pollution prevention plan described in Part II.B. of this permit must be modified within 7 calendar days of knowledge of the release to provide a description of the release and the circumstances leading to the release and to identify and provide for the implementation of steps to prevent the reoccurrence of such releases and to respond to such releases.

B. Storm Water Pollution Prevention Plans. A storm water pollution prevention plan shall be developed for the facility. The storm water pollution prevention plan shall be prepared in accordance with good engineering practices. The plan shall identify potential sources of pollution which may reasonably be expected to affect the quality of storm water discharges associated with industrial activity from the facility. The plan shall describe and ensure the implementation of practices which will be used to reduce pollutants in storm water discharges associated with industrial activity at the facility and to assure compliance with the terms and conditions of this permit. Facilities must implement the provisions of the storm water pollution prevention plan required under this part as a condition of this permit.

1. Deadlines for Plan Preparation and Compliance. Preparation of and compliance with the pollution prevention plan shall be as follows.

a. For storm water discharge associated with industrial activity in existence prior to October 1, 1992, the pollution prevention plan shall be completed within 180 days of the issuance date of this permit and shall be updated as appropriate. The pollution prevention plan shall provide for compliance with the terms of the plan within 365 days of the issuance date of this permit.

b. For a storm water discharge associated with industrial activity that commences after October 1, 1992, the pollution prevention plan shall be completed before the application for a NPDES permit or permit amendment is submitted to the Department. Compliance with the terms of the pollution prevention plan and this permit will be required with the start of operation.

c. A pollution prevention plan for storm water discharges associated with industrial activity from an oil and gas exploration, production, processing, or treatment operation or transmission facility that is not excluded according to Part I.C. of this permit shall be completed within 180 days after the exclusion no longer applies. The pollution prevention plan must be implemented within 365 days after the exclusion terminates.

2. a. The pollution prevention plan shall be signed in accordance with standard condition #22 specified elsewhere in this permit, and shall be retained on site in accordance with Part IV.E. of this permit.

b. The owner or operator of a facility with a storm water discharge subject to this permit shall make plans available upon request to the Department or, in the case of a storm water discharge associated with industrial activity which discharges through a large or medium municipal separate storm sewer system with an NPDES permit, to the municipal operator of the system.

c. The Department may review the plan at any time and may notify the permittee that the plan does not meet one or more of the minimum requirements of this permit. After such notification from the Department, the permittee shall make changes to the plan, and shall submit to the Department a written certification that the requested changes have been made. Unless otherwise provided by the Department, the permittee shall have 30 days after such notification to make the necessary changes.

3. The permittee shall amend the plan whenever there is a change in design, construction, operation, or maintenance, which has a significant effect on the potential for the discharge of pollutants to waters of the state, or if the storm water pollution prevention plan proves to be ineffective in achieving the general objectives of controlling pollutants in storm water discharges associated with industrial activity. Amendments to the plan may be reviewed by the Department in the same manner as Part II.B.2.c. above.

4. The plan shall include, at a minimum, the following items:

a. Description of Potential Pollutant Sources. Each plan shall provide a description of potential sources which may reasonably be expected to add significant amounts of pollutants to storm water discharges or which may result in the discharge of pollutants during dry weather from separate storm sewers draining the facility. Each plan shall identify all activities and significant materials which may potentially be significant pollutant sources. Each plan shall include, at a minimum:

a.(1). A site map showing an outline of the drainage area of each storm water outfall; each existing structural control measure to reduce pollutants in storm water runoff; and each surface water body;

a.(2). A narrative description of known significant materials that have been treated, stored or disposed, in a manner to allow exposure to storm water, during the three years prior to the issuance date of this permit; the method of on—site storage or disposal; materials management practices employed to minimize

contact of these materials with storm water runoff; materials loading and access areas; the location and a description of existing structural and non—structural control measures to reduce pollutants in storm water runoff; and a description of any treatment the storm water receives;

a.(3). A list of releases which prompted the existence of a hazardous condition (as defined in Part V of this permit) that occurred at the facility after the issuance date of this permit;

a.(4). For each area of the plant that generates storm water associated with industrial activity with a reasonable potential for containing significant amounts of pollutants, a prediction of the direction of flow, and an estimate of the types of pollutants which are likely to be present in storm water discharges; and,

a.(5). A summary of existing sampling data describing pollutants in storm water discharges.

b. Storm Water Management Controls. The permittee shall develop a description of storm water management controls appropriate to the facility, and, implement such controls. The appropriateness and priorities of controls in a plan shall reflect identified potential sources of pollutants at the facility. The description of storm water management controls shall address the following minimum components, including a schedule for implementing such controls:

b.(1). Responsible Person. The plan shall identify a specific individual or individuals within the organization responsible for developing the storm water pollution prevention plan and assisting in its implementation, maintenance, and revision.

b.(2). Risk Identification and Assessment/Material Inventory. The storm water pollution prevention plan shall assess the potential of various sources at the plant to contribute pollutants to storm water discharges associated with industrial activity. The plan shall include an inventory of the types of materials handled. Facilities subject to SARA Title III, Section 313 shall include in the plan a description of releases to land or water of SARA Title III water priority chemicals that have occurred during the three years prior to the issuance date of this permit. Each of the following shall be evaluated for the reasonable potential for contributing pollutants to runoff:

(a). loading and unloading operations;
(b). outdoor storage activities;
(c). outdoor manufacturing or processing activities;
(d). dust or particulate generating processes;
(e). on—site waste disposal practices.

Factors to consider include the toxicity of chemicals; quantity of chemicals used, produced, or discharged; the likelihood of contact with storm water; and history of "hazardous condition" reporting.

b.(3). Preventive Maintenance. The plan shall describe a preventive maintenance program that involves inspection and maintenance of storm water management devices (e.g. cleaning oil/water separators, catch basins) as well as inspecting and testing plant equipment and systems to uncover conditions that could cause breakdowns or failures resulting in discharges of pollutants to surface waters.

b.(4). Good Housekeeping. Good housekeeping requires the maintenance of a clean, orderly facility.

b.(5). Spill Prevention and Response Procedures. Areas where potential spills can occur, and their accompanying drainage points shall be identified clearly in the storm water pollution prevention plan. Where appropriate, material handling procedures and storage requirements should be considered in the plan. Procedures for cleaning up spills shall be identified in the plan and made available to the appropriate personnel. The necessary equipment to implement a clean up shall be available to personnel.

b.(6). Storm Water Management. The plan shall contain a narrative consideration of the appropriateness of traditional storm water management practices (practices other than those which control the source of pollutants). Based on an assessment of the potential of various

sources at the plant to contribute pollutants to storm water discharges associated with industrial activity (see Part II.B.4.b.(2). of this permit), the plan shall provide that measures determined to be reasonable and appropriate shall be implemented and maintained.

b.(7). Sediment and Erosion Prevention. The plan shall identify areas which, due to topography, activities, or other factors, have a high potential for significant soil erosion, and identify measures to limit erosion.

b.(8). Employee Training. Employee training programs shall inform personnel, at all levels of responsibility, of the components and goals of the storm water pollution prevention plan. Training should address topics such as spill response, good housekeeping and material management practices. The pollution prevention plan shall identify periodic dates for such training.

b.(9). Recordkeeping and Internal Reporting Procedures. Incidents such as spills, or other discharges, along with other information describing the quality and quantity of storm water discharges shall be included in the records. Inspection and maintenance activities shall be documented and recorded.

b.(10). Non—Storm Discharges. The plan shall include a certification that storm water only discharges have been tested or evaluated for the presence of non—storm water discharges. The certification shall include a description of the results of any test for the presence of non—storm water discharges, the method used, the date of any testing, and the on—site drainage points that were directly observed during the test. This certification may not be feasible if the facility operating the storm water discharge does not have access to an outfall, manhole, or other point of access to the ultimate conduit which receives the discharge. In such cases, the source identification section of the storm water pollution plan shall indicate why the certification required by this part was not feasible. A discharger that is unable to provide the certification required by this paragraph must notify in accordance with Part IV.A. of this permit.

c. Visual Inspection. Qualified personnel shall inspect designated equipment and plant areas at appropriate intervals specified in the plan, but, except as provided in paragraphs II.B.4.c.(4). and (5)., in no case less than once a year;

c.(1). Material handling areas and other potential sources of pollution identified in the plan in accordance with paragraph II.B.4.a. of this permit shall be inspected for evidence of, or the potential for, pollutants entering the drainage system. Structural storm water management measures, sediment and erosin control measures, and other structural pollution prevention measures identified in the plan shall be observed to ensure that they are operating correctly. A visual inspection of equipment needed to implement the plan, such as spill response equipment, shall be made.

c.(2). Based on the results of the inspection, the description of potential pollutant sources identified in the plan in accordance with paragraph II.C.4.a. of this permit and pollution prevention measures identified in the plan in accordance with paragraph II.C.4.b. of this permit shall be revised as appropriate within two (2) weeks of such inspection and shall provide for implementation of any changes to the plan in a timely manner, but in no case less than twelve weeks from the inspection.

c.(3). A report summarizing the scope of the inspection, personnel making the inspection, the date(s) of the inspection, major observations relating to the implementation of the storm water pollution prevention plan, and actions taken in accordance with paragraph II.B.4.c.(2). of the permit shall be made and retained as part of the storm water pollution prevention plan for at least three years. The report shall be signed in accordance with Part II.B.2.a. of this permit.

c.(4). Where annual site inspections are shown in the plan to be impractical because an employee is not stationed or does not routinely visit the site, site inspections required under this part shall be conducted at appropriate intervals specified in the plan, but, in no case less than once in three years.

c.(5). Where annual site inspections are shown in the plan to be impractical because the site is inactive (industrial activity is no longer conducted), site inspections required under this part shall be conducted at appropriate intervals specified in the plan, but, in no case less than once in five years. At least one site inspection shall be conducted prior to October 1, 1994, or the date two years after such site becomes inactive.

d. Special Requirements for Storm Water Discharges Associated with Industrial Activity Through Municipal Separate Storm Sewer Systems Serving a Population of 100,000 or More. The permittee must comply with applicable requirements in municipal storm water management programs developed under NPDES permits issued for the discharge from the municipal separate storm sewer system that receives the facility's discharge provided the discharger has been notified of such conditions.

e. Consistency with Other Plans. Storm water management programs may reflect requirements for Spill Prevention Control and Countermeasure (SPCC) plans under section 311 of the CWA or Best Management Practices (BMP) Programs otherwise required by an NPDES permit and may incorporate any part of such plans into the storm water pollution prevention plan by reference.

f. Additional Requirements for Storm Water Discharge Associated with Industrial Activity from Facilities Subject to SARA Title III, Section 313 Requirements. Storm water pollution prevention plans for facilities subject to reporting requirements under SARA Title III, Section 313 for chemicals which are classified as "Section 313 water priority chemicals" in accordance with the definition in Part V of this permit are required to include, in addition to the information listed above, a discussion of the facility's conformance with the appropriate guidelines listed below:

f.(1). In areas where Section 313 water priority chemicals are stored, processed or otherwise handled, appropriate containment, drainage control and/or diversionary structures shall be provided. At a minimum, one of the following preventive systems or its equivalent shall be used:

f.(1).(a). curbing, culverting, gutters, sewers or other forms of drainage control to prevent or minimize the potential for storm water run—on to come into contact with significant sources of pollutants; or

f.(1).(b). roofs, covers or other forms of appropriate protection to prevent storage piles from exposure to storm water, and wind blowing.

f.(2). If the installation of structures or equipment listed in Parts II.B.4.f.(3).(a).(ii). or II.B.4.f.(3).(c). of this permit is not economically achievable at a given facility, the facility shall develop and implement a spill contingency and integrity testing plan which provides a description of measures that ensure spills or other releases of toxic amounts of Section 313 water priority chemicals do not occur. A spill contingency and integrity plan developed under this paragraph shall comply with the minimum requirements listed in Parts II.B.4.f.(2).(a). through (d).

f.(2).(a). The plan shall include a detailed description which demonstrates that the requirements of paragraphs II.B.4.f.(3).(a).(ii). and II.B.4.f.(3).(c). of this permit are not economically achievable;

f.(2).(b). A spill contingency plan must include, at a minimum:

f.(2).(b).(i). a description of response plans, personnel needs, and methods of mechanical containment;

f.(2).(b).(ii). steps to be taken for removal of spilled Section 313 water priority chemicals;

f.(2).(b).(iii). access to and availability of sorbents and other equipment; and

f.(2).(b).(iv). such other information as required by the Department.

f.(2).(c). The testing component of the alternative plan must provide for conducting integrity testing of storage tanks at least once every five years, and conducting integrity and leak testing of valves and piping a minimum of every year; and

f.(2).(d). A written and actual commitment of manpower, equipment and materials required to comply with the provisions of Parts II.B.4.f.(2).(b). and (c). of this permit and to expeditiously control and remove quantities of Section 313 water priority chemicals that may result in a toxic discharge.

f.(3). In addition to the minimum standards listed under paragraph II.B.4.f.(1). of this permit, the storm water pollution prevention plan shall include a complete discussion of measures taken to conform with the following applicable guidelines:

f.(3).(a). Liquid Storage Areas Where Storm Water Comes into Contact with Equipment or a Tank, Container, or Other Vessel Used for Section 313 Water Priority Chemicals.

f.(3).(a).(i). No tank or container shall be used for the storage of a Section 313 water priority chemical unless its material and construction are compatible with the material stored and conditions of storage such as pressure and temperature, etc.

f.(3).(a).(ii). Secondary containment, sufficient to contain the capacity of the largest single container or tank in a drainage system where Section 313 water priority chemicals are stored shall be provided. If the secondary containment area and its upstream drainage system are subject to precipitation, an allowance for drainage from a 10—year, 24—hour precipitation event shall be provided over and above the volume necessary to contain the largest single tank or container. Either a secondary containment system shall be sufficiently impervious to contain spilled Section 313 water priority chemicals until they can be removed or treated or the plan must include spill contingency provisions which include, at a minimum, a description of response plans, personnel needs, and methods of mechanical containment; steps to be taken for removal of spilled Section 313 water priority chemicals; and access to and availability of sorbents and other equipment. The plant treatment system may be used to provide secondary containment, provided it has sufficient excess holding capacity always available to hold the contents of the largest container in the drainage area plus an allowance for drainage from a 10—year, 24—hour precipitation event.

f.(3).(b). Material Storage Areas for Section 313 Water Priority Chemicals Other Than Liquids. Material storage areas for Section 313 water priority chemicals other than liquids, which are subject to runoff, leaching, or wind blowing, shall incorporate drainage or other control features which will minimize the discharge of Section 313 water priority chemicals.

f.(3).(c). Truck and rail car loading and unloading areas for liquid Section 313 water priority chemicals. Truck and rail car loading and unloading areas for liquid Section 313 water priority chemicals shall be operated to minimize discharges of Section 313 water priority chemicals. Drip pans shall be placed at locations where spillage may occur such as hose connections, hose reels and filler nozzles. Drip pans shall always be used when making and breaking hose connections. A drip pan system shall be installed within the rails of railways to collect spillage from tank cars. Truck loading/unloading docks shall have overhangs or door skirts that enclose the trailer end.

f.(3).(d). In-plant areas where Section 313 water priority chemicals are transferred, processed or otherwise handled. Processing equipment and material handling equipment shall be designed and operated so as to minimize discharges of Section 313 chemicals. Materials used in piping and equipment shall be compatible with the substances handled. Drainage from process and materials handling areas shall be designed as described in paragraphs f.(3).(a)., (b). and (c). of this section. Additional protection, such as covers or guards to prevent wind blowing, spraying or releases from pressure relief vents shall be provided as appropriate to prevent discharge of Section 313 water priority chemicals. Visual inspections or leak tests shall

be provided for overhead piping conveying Section 313 water priority chemicals not equipped with secondary containment.

f.(3).(e). Discharges from areas covered by paragraphs f.(3).(a), (b), (c) or (d).

f.(3).(e).(i). Drainage from areas covered by paragraphs f.(3).(a), (b), (c) or (d) of this part shall be restrained by valves or other positive means to prevent the discharge of a spill or other excessive leakage of Section 313 water priority chemicals. Containment areas may be emptied by pumps or ejectors; however, these shall be manually activated.

f.(3).(e).(ii). Flapper—type drain valves shall not be used to drain containment areas. Valves used for the drainage of containment areas shall, as far as is practical, be of manual, open—and—closed design.

f.(3).(e).(iii). If plant drainage is not engineered as above, the final discharge of all in—plant storm sewers should be equipped to return the spilled material to the facility in the event of an uncontrolled spill of Section 313 water priority chemicals.

f.(3).(e).(iv). Records shall be kept of the frequency and estimated volume (in gallons) of discharges from containment areas.

f.(3).(f). Plant site runoff other than from areas covered by f.(3).(a), (b), (c) or (d). Other areas of the facility (those not addressed in paragraphs f.(3).(a), (b), (c) or (d)), from which runoff which may contain Section 313 water priority chemicals or spills of Section 313 water priority chemicals could cause a discharge, shall incorporate the necessary drainage or other control features to prevent the discharge of spilled or improperly disposed material and ensure the mitigation of pollutants in runoff or leachate.

f.(3).(g). Preventive Maintenance and Housekeeping. All areas of the facility shall be inspected at specific intervals for leaks or conditions that could lead to discharges of Section 313 water priority chemicals or direct contact of storm water with raw materials, intermediate materials, waste materials or products. In particular, plant piping, pumps, storage tanks and bins, pressure vessels, process and material handling equipment, and material bulk storage areas shall be examined for any conditions or failures which could cause a discharge. Inspections shall include examination for leaks, wind blowing, corrosion, support or foundation failure, or other forms of deterioration or noncontainment. Inspection intervals shall be specified in the plan and shall be based on design and operational experience. Different areas may require different inspection intervals. Where a leak or other condition is discovered which may result in significant releases of Section 313 water priority chemicals to the drainage system, corrective action shall be immediately taken or the unit or process shut down until corrective action can be taken. When a leak or noncontainment of a Section 313 water priority chemical has occurred, contaminated soil, debris, or other material must be promptly removed and disposed in accordance with Federal and State requirements and as described in the plan.

f.(3).(h). Facility security. Facilities shall have the necessary security systems to prevent accidental or intentional entry which could cause a discharge. Security systems described in the plan shall address fencing, lighting, vehicular traffic control, and securing of equipment and buildings.

f.(3).(i). Training. Facility employees and contractor personnel using the facility shall be trained in and informed of preventive measures at the facility. Employee training shall be conducted at intervals specified in the plan, but not less than once per year, in matters of pollution control laws and regulations, and in the storm water pollution prevention plan and the particular features of the facility and its operation which are designed to minimize discharges of Section 313 water priority chemicals. The plan shall designate a person who is accountable for spill prevention at the facility and who will set up the necessary spill emergency procedures and reporting requirements so that spills and emergency releases of Section 313 water priority chemicals can be isolated and contained before a

discharge of a Section 313 water priority chemical can occur. Contractor or temporary personnel shall be informed of plant operation and design features in order to prevent discharges or spills from occurring.

g. Salt Storage. Storage piles of salt at a facility that falls under the definition of "storm water discharge associated with industrial activity" where the salt piles are used for deicing or other commercial or industrial purposes shall be enclosed or covered to prevent exposure to precipitation.

h. Non-Storm Water Discharges. Except for flows from fire fighting activities, sources of non-storm water listed in Part III.A.2. of this permit that are combined with storm water discharges associated with industrial activity must be identified in the plan. The plan shall identify and ensure the implementation of appropriate pollution prevention measures for the non-storm water component(s) of the discharge.

5. All storm water pollution prevention plans received by the Department from the permittee are considered reports that shall be available to the public under Section 308(b) of the CWA and Chapter 22 of the Code of Iowa. However, the permittee may claim any portion of a storm water pollution plan as confidential in accordance with Chapter 22 of the Code of Iowa and Iowa Administrative Code (561)--2.5.

6. No condition of this permit shall release the permittee from any responsibility or requirements under other environmental statutes or regulations.

PART III. NUMERIC EFFLUENT LIMITATIONS

Coal Pile Runoff. Any storm water composed in part or in whole of coal pile runoff shall not exceed a maximum concentration at any time of 50 mg/l total suspended solids. The pH of these discharges shall be within the range of 6.0—9.0. However, any untreated overflow from facilities designed, constructed and operated to treat the volume of coal pile runoff which is associated with a 10 year, 24 hour rainfall event shall not be subject to the limitations of this part.

PART IV. MONITORING AND REPORTING REQUIREMENTS

A. Failure to Certify. Any facility that is unable to provide the certification required under Part II.B.4.(b).(10). (testing for non-storm water discharges) within 180 days of the permit issuance date, must prepare a written description of the procedures used in any test conducted for the presence of non—storm water discharges; the results of the test or other relevant observations; potential sources of non—storm water discharges to the storm sewer; and why adequate tests for such storm sewers were not feasible. This "failure to certify" description must be kept on-site and be made available to the Department upon request.

B. Monitoring Requirements. The following storm water monitoring is required for discharges of "storm water discharge associated with industrial activity".

1. Section 313 of SARA Title III Facilities. During the period beginning on the issuance date and lasting through the expiration date of this permit, facilities subject to requirements to report releases into the environment under Section 313 of SARA Title III for chemicals which are classified as Section 313 water priority chemicals are subject to the following monitoring requirements for storm water discharges associated with industrial activity that come into contact with any equipment, tank, container or other vessel used for storage of a Section 313 water priority chemical, or that are located at a truck or rail car loading or unloading area where a Section 313 water priority chemical is handled;

a. Parameters. The parameters to be measured include:

* oil and grease (mg/l);
* five day biochemical oxygen demand (BOD_5) (mg/l)
* chemical oxygen demand (COD) (mg/l);
* total suspended solids (TSS) (mg/l);
* total Kjeldahl nitrogen (TKN) (mg/l);
* total phosphorus (mg/l);
* pH;
* any Section 313 water priority chemical for

which the facility is subject to reporting requirements under Section 313 of the Emergency Planning and Community Right to Know Act of 1986;
* the date and duration (in hours) of the storm event(s) sampled;
* rainfall measurements or estimates (in inches) of the storm event which generated the sampled runoff;
* the duration between the storm event sampled and the end of the previous measurable (greater than 0.1 inch rainfall) storm event; and,
* an estimate of the total volume (in gallons) of the discharge sampled.

b. Frequency of Monitoring. Sampling shall be conducted at least annually (1 time per year) except as provided by paragraphs IV.B.12. or IV.B.13.;

2. Primary Metal Industries. During the period beginning on the issuance date and lasting through the expiration date of this permit, facilities classified as Standard Industrial Classification (SIC) 33 (Primary Metal Industry) are subject to the following monitoring requirements for storm water discharges associated with industrial activity that are discharged from the facility:

a. Parameters. The parameters to be measured include:
* oil and grease (mg/l);
* five day biochemical oxygen demand (BOD_5) (mg/l);
* chemical oxygen demand (COD) (mg/l);
* total suspended solids (TSS) (mg/l);
* total Kjeldahl nitrogen (TKN) (mg/l);
* nitrate plus nitrite nitrogen (mg/l);
* total phosphorus (mg/l);
* pH ;
* total lead (Pb) (mg/l);
* total cadmium (Cd) (mg/l);
* total copper (Cu) (mg/l);
* total arsenic (As) (mg/l);
* total chromium (Cr) (mg/l)
* any pollutant limited in an effluent guideline to which the facility is subject;
* the date and duration (in hours) of the storm event(s) sampled;
* rainfall measurements or estimates (in inches) of the storm event which generated the sampled runoff;
* the duration between the storm event sampled and the end of the previous measurable (greater than 0.1 inch rainfall) storm event; and,
* an estimate of the size of the drainage area (in square feet) and an estimate of the runoff coefficient of the drainage area (e.g. low (under 40%), medium (40% to 65%) or high (above 65%));

b. Frequency of Monitoring. Sampling shall be conducted at least annually (1 time per year) except as provided by paragraphs IV.B.12. or IV.B.13.;

3. Land Disposal Units/Incinerators. During the period beginning on the issuance date and lasting through the expiration date of this permit, storm water discharge associated with industrial activity from any active or inactive landfill, land application site, or open dump that received any industrial wastes (except facilities that only receive construction debris) and that have not installed a stabilized final cover, and incinerators that burn hazardous waste and operate under interim status or a permit under Subtitle C of RCRA, are subject to the following monitoring requirements:

a. Parameters. The parameters to be measured include:

* ammonia (mg/l);
* bicarbonate (mg/l);
* calcium (mg/l);
* chloride (mg/l);
* total iron (mg/l);
* magnesium (total) (mg/l);
* magnesium (dissolved) (mg/l);
* nitrate plus nitrite nitrogen (mg/l);
* potassium (mg/l);
* sodium (mg/l);
* sulfate (mg/l);
* chemical oxygen demand (COD) (mg/l);
* total dissolved solids (TDS) (mg/l);
* total organic carbon (TOC) (mg/l);
* oil and grease (mg/l);
* pH;
* total arsenic (As) (mg/l);
* total barium (Ba) (mg/l);
* total cadmium (Cd) (mg/l);

* total chromium (Cr) (mg/l);
* total cyanide (CN) (mg/l);
* total lead (Pb) (mg/l);
* total mercury (Hg) (mg/l);
* total selenium (Se) (mg/l);
* total silver (Ag) (mg/l);
* the date and duration (in hours) of the storm event(s) sampled;
* rainfall measurements or estimates (in inches) of the storm event which generated the sampled runoff;
* the duration between the storm event sampled and the end of the previous measurable (greater than 0.1 inch rainfall) storm event; and,
* an estimate of the total volume (in gallons) of the discharge sampled.

b. Frequency of Monitoring. Sampling shall be conducted at least annually (1 time per year) except as provided by paragraphs IV.B.12. or IV.B.13.;

4. Wood Treatment (chlorophenolic/creosote formulations). During the period beginning on the issuance date and lasting through the expiration date of this permit, storm water discharges associated with industrial activity from areas that are used for wood treatment, wood surface application or storage of treated or surface protected wood at any wood preserving or wood surface facilities that currently use chlorophenolic formulations and/or creosote formulations are subject to the following monitoring requirements:

a. Parameters. The parameters to be measured include:
* oil and grease (mg/l);
* pH;
* five day biochemical oxygen demand (BOD_5) (mg/l);
* chemical oxygen demand (COD) (mg/l);
* total suspended solids (TSS) (mg/l);
* total phosphorus (mg/l);
* total Kjeldahl nitrogen (TKN) (mg/l);
* nitrate plus nitrite nitrogen (mg/l);
* pentachlorophenol (mg/l);
* the date and duration (in hours) of the storm event(s) sampled;
* rainfall measurements or estimates (in inches) of the storm event which generated the sampled runoff;
* the duration between the storm event sampled and the end of the previous measurable (greater than 0.1 inch rainfall) storm event; and,
* an estimate of the size of the drainage area (in square feet) and an estimate of the runoff coefficient of the drainage area (e.g. low (under 40%), medium (40% to 65%) or high (above 65%)).

b. Frequency of Monitoring. Sampling shall be conducted at least annually (1 time per year) except as provided by paragraphs IV.B.12. or IV.B.13.;

5. Wood Treatment (arsenic or chromium preservatives). During the period beginning on the issuance date and lasting through the expiration date of this permit, storm water discharge associated with industrial activity from areas that are used for wood treatment or storage of treated wood at any wood preserving facilities that currently use inorganic preservatives containing arsenic or chromium are subject to the following monitoring requirements:

a. Parameters. The parameters to be measured include:

* oil and grease (mg/l);
* pH;
* five day biochemical oxygen demand (BOD_5) (mg/l);
* chemical oxygen demand (COD) (mg/l);
* total suspended solids (TSS) (mg/l);
* total phosphorus (mg/l);
* total Kjeldahl nitrogen (TKN) (mg/l);
* nitrate plus nitrite nitrogen (mg/l);
* total arsenic (As) (mg/l);
* total chromium (Cr) (mg/l);
* total copper (Cu) (mg/l);
* the date and duration (in hours) of the storm event(s) sampled;
* rainfall measurements or estimates (in inches) of the storm event which generated the sampled runoff;
* the duration between the storm event sampled and the end of the previous measurable (greater than 0.1 inch rainfall) storm event; and,
* an estimate of the size of the drainage area (in square feet) and an estimate of the runoff coefficient of the drainage area (e.g. low (under

40%), medium (40% to 65%) or high(above 65%)).

b. Frequency of Monitoring. Sampling shall be conducted at least annually (1 time per year) except as provided by paragraphs IV.B.12. or IV.B.13.;

6. Coal Pile Runoff. During the period beginning on the issuance date and lasting through the expiration date of this permit, storm water discharge associated with industrial activity from coal pile runoff are subject to the following monitoring requirements:

a. Parameters. The parameters to be measured include:

* oil and grease (mg/l);
* pH;
* total suspended solids (TSS) (mg/l);
* total copper (Cu) (mg/l);
* total nickel (Ni) (mg/l);
* total zinc (Zn) (mg/l);
* the date and duration (in hours) of the storm event(s) sampled;
* rainfall measurements or estimates (in inches) of the storm event which generated the sampled runoff;
* the duration between the storm event sampled and the end of the previous measurable (greater than 0.1 inch rainfall) storm event; and,
* an estimate of the size of the drainage area (in square feet) and an estimate of the runoff coefficient of the drainage area (e.g. low (under 40%), medium (40% to 65%) or high (above 65%)).

b. Frequency of Monitoring. Sampling shall be conducted at least annually (1 time per year) except as provided by paragraphs IV.B.12. or IV.B.13.;

7. Animal Handling / Meat Packing. During the period beginning on the issuance date and lasting through the expiration date of this permit, storm water discharge associated with industrial activity from animal handling areas, manure management (or storage) areas, and production waste management (or storage) areas that are exposed to precipitation at meat packing plants, poultry packing plants, facilities that manufacture animal and marine fats and oils, and facilities that manufacture dog and cat food from meat are subject to the following monitoring requirements:

a. Parameters. The parameters to be measured include:

* oil and grease (mg/L);
* five day biochemical oxygen demand (BOD_5) (mg/L);
* chemical oxygen demand (COD) (mg/l);
* total suspended solids (TSS) (mg/l);
* total Kjeldahl nitrogen (TKN) (mg/l);
* total phosphorus (mg/l);
* pH;
* fecal coliform (counts per 200 ml)
* the date and duration (in hours) of the storm event(s) sampled;
* rainfall measurements or estimates (in inches) of the storm event which generated the sampled runoff;
* the duration between the storm event sampled and the end of the previous measurable (greater than 0.1 inch rainfall) storm event; and
* an estimate of the total volume (in gallons) of the discharge sampled shall be provided;

b. Frequency of Monitoring. Sampling shall be conducted at least annually (1 times per year) except as provided by paragraph IV.B.12. or IV.B.13.;

8. Battery Reclaimers — During the period beginning on the issuance date and lasting through the expiration date of this permit, storm water discharge associated with industrial activity from facilities that reclaim lead acid batteries are subject to the following monitoring requirements:

a. Parameters. The parameters to be measured include:

* oil and grease (mg/l);
* five day biochemical oxygen demand (BOD_5) (mg/l);
* chemical oxygen demand (COD) (mg/l);
* total suspended solids (TSS) (mg/l);
* total Kjeldahl nitrogen (TKN) (mg/l);
* total phosphorus (mg/l);
* pH;
* lead (Pb) (mg/l)
* the date and duration (in hours) of the storm

event(s) sampled;
* rainfall measurements or estimates (in inches) of the storm event which generated the sampled runoff;
* the duration between the storm event sampled and the end of the previous measurable (greater than 0.1 inch rainfall) storm event; and
* an estimate of the total volume (in gallons) of the discharge sampled shall be provided;

b. Frequency of Monitoring. Sampling shall be conducted at least annually (1 time per year) except as provided by paragraph IV.B.12. or IV.B.13.;

9. Coal-fired Steam Electric Facilities. During the period beginning on the issuance date and lasting through the expiration date of this permit, storm water discharge associated with industrial activity from coal handling sites at coal fired steam electric power generating facilities, except for coal piles, are subject to the following monitoring requirements:

a. Parameters. The parameters to be measured include:

* oil and grease (mg/l);
* total suspended solids (TSS) (mg/l);
* copper (Cu) (mg/l);
* nickel (Ni) (mg/l);
* zinc (Zn) (mg/l);
* pH;
* the date and duration (in hours) of the storm event(s) sampled;
* rainfall measurements or estimates (in inches) of the storm event which generated the sampled runoff;
* the duration between the storm event sampled and the end of the previous measurable (greater than 0.1 inch rainfall) storm event; and
* an estimate of the total volume (in gallons) of the discharge sampled shall be provided;

b. Frequency of Monitoring. Sampling shall be conducted at least annually (1 time per year) except as provided by paragraph IV.B.12. or IV.B.13.;

10. Additional facilities. During the period beginning on the issuance date and lasting through the expiration date of this permit, facilities with storm water discharge associated with industrial activity that: come in contact with storage piles for solid chemicals used as raw materials that are exposed to precipitation at facilities classified as SIC 30 (Rubber and Miscellaneous Plastics Products) or SIC 28 (Chemicals and Allied Products); automobile junkyards with over 250 units; come into contact with lime storage piles that are exposed to precipitation at lime manufacturing facilities; from oil handling sites at oil fired steam electric power generating facilities; from facilities that manufacture asphalt paving mixtures and blocks; from cement manufacturing facilities and cement kilns; from ready—mixed concrete facilities; or from ship building and repairing facilities, are subject to the following monitoring requirements:

a. Parameters. The parameters to be measured include:

* oil and grease (mg/l);
* five day biochemical oxygen demand (BOD_5) (mg/l);
* chemical oxygen demand (COD) (mg/l);
* total suspended solids (TSS) (mg/l);
* total Kjeldahl nitrogen (TKN) (mg/l);
* total phosphorus (mg/l);
* pH;
* any pollutant limited in an effluent guideline to which the facility is subject
* the date and duration (in hours) of the storm event(s) sampled;
* rainfall measurements or estimates (in inches) of the storm event which generated the sampled runoff;
* the duration between the storm event sampled and the end of the previous measurable (greater than 0.1 inch rainfall) storm event; and
* an estimate of the total volume (in gallons) of the discharge sampled shall be provided;

b. Frequency of Monitoring. Sampling shall be conducted at least annually (1 time per year) except as provided by paragraph IV.B.12. or IV.B.13.;

11. Sample Type. For discharges from holding ponds or other impoundments with a retention period greater than 24 hours, (estimated by dividing the volume of the detention pond by the discharge rate) a minimum of one grab sample may be taken. For all other discharges, data shall be reported for both a grab sample and a composite sample. All samples shall be collected from a discharge resulting from a storm event that is greater than 0.1 inches in magnitude and that occurs at least 72 hours from the previously measurable (greater than 0.1 inch rainfall) storm event. The grab sample shall be taken during the first hour of the discharge. The composite sample shall either be flow—weighted or time—weighted. Composite samples may be taken with a continuous sampler or as a combination of a minimum of three sample aliquots taken in each hour of discharge for the entire discharge or for the first three hours of the discharge, with each aliquot being separated by a minimum period of fifteen minutes. Only grab samples may be collected and analyzed for the determination of pH, temperature, cyanide, total phenols, residual chlorine, fecal coliform, fecal streptococcus, and oil and grease.

12. Sampling Waiver. When a discharger is unable to collect samples due to adverse climatic conditions, the discharger must explain, in writing, why samples could not be collected, including available documentation of the event, and retain a copy of the explanation in accordance with Part IV.E. of this permit. Adverse climatic conditions which may prohibit the collection of samples include weather that creates dangerous conditions for personnel (such as local flooding, high winds, tornadoes, electrical storms, etc.) or otherwise make the collection of a sample impracticable (drought, extended frozen conditions, etc.).

13. Representative Discharge. When a facility has two or more outfalls that, based on a consideration of features and activities within the area drained by the outfall, the permittee reasonably believes discharge substantially identical effluents, the permittee may test the effluent of one of such outfalls and report that the quantitative data also applies to the substantially identical outfall(s). In addition, for each outfall that the permittee believes is representative, an estimate of the size of the drainage area (in square feet) and an estimate of the runoff coefficient of the drainage area (e.g. low (under 40%), medium (40% to 65%) or high (above 65%)) shall be provided.

C. Noncompliance Reporting. Permittees that are not required to monitor must report all incidences of non-compliance, in writing, to the Department at least annually.

D. Reporting.

1. Permittees which are subject to the monitoring requirement of Part III NUMERIC EFFLUENT LIMITATIONS are required to submit signed copies of discharge monitoring results on Discharge Monitoring Report Forms(s) within 30 days after the sampling occurred.

2. Except as provided in Part D.1., permittees are not required to submit results of stormwater monitoring. However, such permittees must retain monitoring results in accordance with Part IV.E. and make the results available to the Department upon request.

3. Additional Notification. Facilities with at least one storm water discharge associated with industrial activity that discharges through a large or medium municipal separate storm sewer system (systems serving a population of 100,000 or more) must submit signed copies of discharge monitoring reports or results to the operator of the municipal separate storm sewer system upon request.

E. Retention of Records.

1. The permittee shall retain a copy of the storm water pollution prevention plan, records of all monitoring information, copies of all reports required by this permit, and records of all data for the duration of the permit or for a period of at least three years from the date of the measurement, report, inspection, etc.

2. Permittees must submit results of stormwater monitoring to the Department upon the request of the Department, and submit a summary of monitoring results as part of the application for renewal of this permit.

PART V. DEFINITIONS

"Best Management Practices" ("BMPs") means schedules of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce the pollution of waters of the United States. BMPs also include treatment requirements, operating procedures, and practices to control plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage.

"Bypass" means the intentional diversion of waste streams from any portion of a treatment facility.

"Coal pile runoff" means the rainfall runoff from or through any coal storage pile.

"CWA" or "Clean Water Act" means the Federal Water Pollution Control Act.

"Department" means the Iowa Department of Natural Resources.

"Flow—weighted composite sample" means a composite sample consisting of a mixture of aliquots collected at a constant time interval, where the volume of each aliquot is proportional to the flow rate of the discharge.

"Hazardous condition" means any situation involving the actual, imminent, or probable spillage, leakage, or release of a hazardous substance on to the land, into a water of the state, or into the atmosphere, which creates an immediate or potential danger to the public health or safety or to the environment. 455B.381(2) 1991, Code of Iowa

"Hazardous substance" means any substance or mixture of substances that presents a danger to the public health or safety and includes, but in not limited to, a substance that is toxic, corrosive, or flammable, or that is an irritant or that, in confinement, generates pressure through decomposition, heat, or other means. The following are examples of substances which, in sufficient quantity may be hazardous: acids; alkalis; explosives; fertilizers; heavy metals such as chromium, arsenic, mercury, lead and cadmium; industrial chemicals; paint thinners; paints; pesticides; petroleum products; poisons, radioactive materials; sludges; and organic solvents. "Hazardous substances" may include any hazardous waste identified or listed by the administrator of the United State Environmental Protection Agency under the Solid Waste Disposal Act as amended by the Resource Conservation and Recovery Act of 1976, or any toxic pollutant listed under section 307 of the federal Water Pollution Control Act as amended to January 1, 1977, or any hazardous substance designated under section 311 of the federal Water Pollution Control Act as amended to January 1, 1977, or any hazardous material designated by the secretary of transportation under the Hazardous Materials Transportation Act (49 CFR 172.101). 455B.381(1) , 1991 Code of Iowa

"Landfill" means an area of land or an excavation in which wastes are placed for permanent disposal, and which is not a land application unit, surface impoundment, injection well, or waste pile.

"Land application unit" means an area where wastes are applied onto or incorporated into the soil surface (excluding manure spreading operations) for treatment or disposal.

"Large and Medium municipal separate storm sewer system" means all municipal separate storm sewers that are either:

(i) located in an incorporated place with a population of 100,000 or more as determined by the latest Decennial Census by the Bureau of Census; or

(ii) located in the counties with unincorporated urbanized populations of 100,000 or more, except municipal separate storm sewers that are located in the incorporated places, townships or towns within such counties; or

(iii) owned or operated by a municipality other than those described in paragraph (i) or (ii) and that are designated by the Department as part of the large or medium municipal separate storm sewer system.

"Municipality" means a city, town, borough, county, parish, district, association, or other public body created by or under State law.

"Runoff coefficient" means the fraction of total rainfall that will appear at the conveyance as runoff.

"**Section 313 water priority chemical**" means a chemical or chemical categories which are:

1) Listed at 40 CFR 372.65 pursuant to Section 313 of Title III of the Superfund Amendments and Reauthorization Act (SARA) of 1986, also titled the Emergency Planning and Community Right—to—Know Act of 1986;

2) Present at or above threshold levels at a facility subject to SARA Title III, Section 313 reporting requirements; and

3) Meet at least one of the following criteria:

(i) are listed in Appendix D of 40 CFR 122 on either Table II (organic priority pollutants), Table III (certain metals, cyanides, and phenols) or Table V (certain toxic pollutants and hazardous substances);

(ii) are listed as a hazardous substance pursuant to section 311(b)(2)(A) of the CWA at 40 CFR 116.4; or

(iii) are pollutants for which EPA has published acute or chronic water quality criteria.

"**Severe property damage**" means substantial physical damage to property, damage to treatment facilities which causes them to become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production.

"**Storm water**" means storm water runoff, snow melt runoff, and surface runoff and drainage.

"**Storm water discharge associated with industrial activity**" means the discharge from any conveyance which is used for collecting and conveying storm water and which is directly related to manufacturing, processing or raw materials storage areas at an industrial plant. The term does not include discharges from facilities or activities excluded from the NPDES program under 40 CFR part 122. For the categories of industries identified in paragraphs (i) through (x) of this definition, the term includes, but is not limited to, storm water discharges from industrial plant yards; immediate access roads and rail lines used or traveled by carriers of raw materials, manufactured products, waste material, or by-products used or created by the facility; material handling sites; refuse sites; sites used for the application or disposal of process waste waters (as defined at 40 CFR part 401); sites used for the storage and maintenance of material handling equipment; sites used for residual treatment, storage, or disposal; shipping and receiving areas; manufacturing buildings; storage areas (including tank farms) for raw materials, and intermediate and finished products; and areas where industrial activity has taken place in the past and significant materials remain and are exposed to storm water.

For the categories of industries identified in paragraph (xi) of this definition, the term includes only storm water discharges from all the areas (except access roads and rail lines) that are listed in the previous sentence where material handling equipment or activities, raw materials, intermediate products, final products, waste materials, by-products, or industrial machinery are exposed to storm water. For the purposes of this paragraph, material handling activities include the storage, loading and unloading, transportation, or conveyance of any raw material, intermediate product, finished product, by-product, or waste product. The term excludes areas located on plant lands separate from the plant's industrial activities, such as office buildings and accompanying parking lots as long as the drainage from the excluded areas is not mixed with storm water drained from the above described areas. Industrial facilities (including industrial facilities that are Federally, State, or municipally owned or operated that meet the description of the facilities listed in these paragraphs (i)-(xi) of the definition) include those facilities designated under 40 CFR 122.26(a)(1)(v). The following categories of facilities are considered to be engaging in "industrial activity" for purposes of this definition;

(i) Facilities subject to storm water effluent limitations guidelines, new source performance standards, or toxic pollutant effluent standards under 40 CFR Subchapter N (except facilities with toxic pollutant effluent standards which are exempted under category (xi) of this definition);

(ii) Facilities classified as Standard Industrial Classifications 24 (except 2434), 26 (except 265 and 267), 28 (except 283 and 285), 29, 311, 32 (except 323), 33, 3441, 373;

(iii). Facilities classified as Standard Industrial Classifications 10 through 14 (mineral industry) including active or inactive mining operations (except for areas of coal mining operations no longer meeting the definition of a reclamation area under 40 CFR 434.11(1) because the performance bond issued to the facility by the appropriate SMCRA authority has been released, or except for areas of non-coal mining operations which have been released from applicable State or Federal reclamation requirements after December 17, 1990) and oil and gas exploration, production, processing, or treatment operations, or transmission facilities that discharge storm water contaminated by contact with or that has come into contact with, any overburden, raw material, intermediate products, finished products, byproducts or waste products located on the site of such operations; (inactive mining operations are mining sites that are not being actively mined, but which have an identifiable owner/operator; inactive mining sites do not include sites where mining claims are being maintained prior to disturbances associated with the extraction, beneficiation, or processing of mined materials, nor sites where minimal activities are undertaken for the sole purpose of maintaining a mining claim);

(iv) Hazardous waste treatment, storage, or disposal facilities, including those that are operating under interim status or a permit under Subtitle C of RCRA;

(v) Landfills, land application sites, and open dumps that receive or have received any industrial wastes (waste that is received from any of the facilities described under this subsection) including those that are subject to regulation under Subtitle D of RCRA;

(vi) facilities involved in the recycling of materials, including metal scrap yards, battery reclaimers, salvage yards, and automobile junkyards, including but limited to those classified as Standard Industrial Classification 5015 and 5093;

(vii) Steam electric power generating facilities, including coal handling sites;

(viii) Transportation facilities classified as Standard Industrial Classifications 40, 41, 42 (except 4221-4225), 43, 44, 45 and 5171 which have vehicle maintenance shops, equipment cleaning operations, or airport deicing operations. Only those portions of the facility that are either involved in vehicle maintenance (including vehicle rehabilitation, mechanical repairs, painting, fueling, and lubrication), equipment cleaning operations, airport deicing operations, or which are otherwise identified under paragraphs (i)-(vii) or (ix)-(xi) of this definition are associated with industrial activity;

(ix) Treatment works treating domestic sewage or any other sewage sludge or wastewater treatment device or system, used in the storage treatment, recycling, and reclamation of municipal or domestic sewage, including land dedicated to the disposal of sewage sludge that are located within the confines of the facility, with a design flow of 1.0 mgd or more, or required to have an approved pretreatment program under 40 CFR 403. Not included are farm lands, domestic gardens or lands used for sludge management where sludge is beneficially reused and which are not physically located in the confines of the facility, or areas that are in compliance with 40 CFR 503;

(x) Construction activity including clearing, grading and excavation activities except: operations that result in the disturbance of less than five acres of total land area which are not part of a larger common plan of development or sale;

(xi) Facilities under Standard Industrial Classifications 20, 21, 22, 23, 2434, 25, 265, 267, 27, 283, 285, 30, 31 (except 311), 323, 34 (except 3441), 35, 36, 37 (except 373), 38, 39, 4221-4225, (and which are not otherwise included within categories (ii)-(x));

"Time-weighted composite" means a composite sample consisting of a mixture of equal volume aliquots collected at a constant time interval.

"Uncontrolled sanitary landfill" means a landfill, or open dump, whether in operation or closed, that does not meet the requirements for runon or runoff control established pursuant to subtitle D of the Solid Waste Disposal Act.

"10-year, 24-hour precipitation event" means the maximum 24-hour precipitation event with a probable reoccurrence interval of once in 10 years. This information is available in "Weather Bureau Technical Paper No. 40,", May 1961 and may be obtained from the National Climatic Center of the Environmental Data Service, National Oceanic and Atmospheric Administration, U.S. Department of Commerce.

Revised 04/05/94

STANDARD CONDITIONS

1. **DEFINITIONS**

(a) 7 day average means the sum of the total daily discharges by mass, volume or concentration during a 7 consecutive day period, divided by the total number of days during the period that measurements were made. Four 7 consecutive day periods shall be used each month to calculate the 7-day average. The first 7-day period shall begin with the first day of the month.

(b) 30 day average means the sum of the total daily discharges by mass, volume or concentration during a calendar month, divided by the total number of days during the month that measurements were made.

(c) daily maximum means the total discharge by mass, volume or concentration during a twenty-four hour period.

2. **DUTY TO COMPLY**

You must comply with all conditions of this permit. Any permit noncompliance constitutes a violation of the Clean Water Act and is grounds for enforcement action; permit termination, revocation and reissuance, or modification; or denial of a permit renewal application. Issuance of this permit does not relieve you of the responsibility to comply with all local, state and federal laws, ordinances, regulations or other legal requirements applying to the operation of your facility.
{See 40 CFR 122.41(a) and 567-64.3(11) IAC}

3. **DUTY TO REAPPLY**

If you wish to continue to discharge after the expiration date of this permit you must file an application for reissuance at least 180 days prior to the expiration date of this permit.
{See 567-64.3(1) IAC}

4. **NEED TO HALT OR REDUCE ACTIVITY**

It shall not be a defense for a permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.
{See 567-64.7(5)(j) IAC}

5. **DUTY TO MITIGATE**

You shall take all reasonable steps to minimize or prevent any discharge in violation of this permit which has a reasonable likelihood of adversely affecting human health or the environment.
{See 567-64.7(5)(i) IAC}

6. **PROPERTY RIGHTS**

This permit does not convey any property rights of any sort or any exclusive privileges.

7. **TRANSFER OF TITLE**

If title to your facility, or any part of it, is transferred the new owner shall be subject to this permit.
{See 567-64.14 IAC}

You are required to notify the new owner of the requirements of this permit in writing prior to any transfer of title. The Director shall be notified in writing within 30 days of the transfer

8. **PROPER OPERATION AND MAINTENANCE**

All facilities and control systems shall be operated as efficiently as possible and maintained in good working order. A sufficient number of staff, adequately trained and knowledgeable in the operation of your facility shall be retained at all times and adequate laboratory controls and appropriate quality assurance procedures shall be provided to maintain compliance with the conditions of this permit.
{See 40 CFR 122.41(e) and 567 64.7(5)(f) IAC}

9. **DUTY TO PROVIDE INFORMATION**

You must furnish to the Director, within a reasonable time, any information the Director may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit or to determine compliance with this permit. You must also furnish to the Director, upon request, copies of any records required to be kept by this permit.

10. **MAINTENANCE OF RECORDS**

You are required to maintain records of your operation in accordance with 567-63.2 IAC.

11. **PERMIT MODIFICATION, SUSPENSION OR REVOCATION**

(a) This permit may be modified, suspended, or revoked and reissued for cause including but not limited to those specified in 567-64.3(11) IAC.

(b) This permit may be modified due to conditions or information on which this permit is based, including any new standard the department may adopt that would change the required effluent limits.
{See 567-64.3(11)° IAC}

(c) If a toxic pollutant is present in your discharge and more stringent standards for toxic pollutants are established under Section 307(a) of the Clean Water Act, this permit will be modified in accordance with the new standards.
{See 567-64.7(5)(g) IAC}

The filing of a request for a permit modification, revocation or suspension, or a notification of planned changes or anticipated noncompliance does not stay any permit condition.

12. **SEVERABILITY**

The provisions of this permit are severable and if any provision or application of any provision to any circumstance is found to be invalid by this department or a court of law, the application of such provision to other circumstances, and the remainder of this permit, shall not be affected by such finding.

STANDARD CONDITIONS

13. INSPECTION OF PREMISES, RECORDS, EQUIPMENT, METHODS AND DISCHARGES
You are required to permit authorized personnel to:

(a) Enter upon the premises where a regulated facility or activity is located or conducted or where records are kept under conditions of this permit.

(b) Have access to and copy, at reasonable times, any records that must be kept under the conditions of this permit.

(c) Inspect, at reasonable times, any facilities, equipment, practices or operations regulated or required under this permit.

(d) Sample or monitor, at reasonable times, for the purpose of assuring compliance or as otherwise authorized by the Clean Water Act.

14. TWENTY-FOUR HOUR REPORTING
You shall report any noncompliance that may endanger human health or the environment. Information shall be provided orally within 24 hours from the time you become aware of the circumstances. A written submission that includes a description of noncompliance and its cause; the period of noncompliance including exact dates and times, whether the noncompliance has been corrected or the anticipated time it is expected to continue; and the steps taken or planned to reduce, eliminate, and prevent a reoccurrence of the noncompliance must be provided within 5 days of the occurrence. The following instances of noncompliance must be reported within 24 hours of occurrence:

(a) Any unanticipated bypass which exceeds any effluent limitation in the permit.
{See 40 CFR 122.44(g)}

(b) Any upset which exceeds any effluent limitation in the permit.
{See 40 CFR 122.44(n)}

(c) Any violation of a maximum daily discharge limit for any of the pollutants listed by the Director in the permit to be reported within 24 hours.
{See 40 CFR 122.44(g)}

15. OTHER NONCOMPLIANCE
You shall report all instances of noncompliance not reported under Condition #14 at the time monitoring reports are submitted.

16. ADMINISTRATIVE RULES
Rules of this Department which govern the operation of your facility in connection with this permit are published in Part 567 of the Iowa Administrative Code (IAC) in Chapters 60-64 and 120-122. Reference to the term "rule" in this permit means the designated provision of Part 567 of the Iowa Administrative Code.

17. NOTICE OF CHANGED CONDITIONS
You are required to report any changes in existing conditions or information on which this permit is based:

(a) Facility expansions, production increases or process modifications which may result in new or increased discharges of pollutants must be reported to the Director in advance. If such discharges will exceed effluent limitations, your report must include an application for a new permit.
{See 567-64.7(5)(a) IAC}

(b) If any modification of, addition to, or construction of a disposal system is to be made, you must first obtain a written permit from this Department.
{See 567-64.2 IAC}

(c) If your facility is a publicly owned treatment works or otherwise may accept waste for treatment from industrial contributors see 567-64.3(5) IAC for further notice requirements.

(d) You shall notify the Director as soon as you know or have reason to believe that any activity has occurred or will occur which would result in the discharge of any toxic pollutant which is not limited in this permit.
{See 40 CFR 122.42(a)}

You must also notify the Director if you have begun or will begin to use or manufacture as an intermediate or final product or byproduct any toxic pollutant which was not reported in the permit application

18. OTHER INFORMATION
Where you become aware that you failed to submit any relevant facts in a permit application, or submitted incorrect information in a permit application or in any report, you must promptly submit such facts or information.

STANDARD CONDITIONS

19. UPSET PROVISION

(a) Definition - "Upset" means an exceptional incident in which there is unintentional and temporary noncompliance with technology based permit effluent limitations because of factors beyond the reasonable control of the permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation.

(b) Effect of an upset. An upset constitutes an affirmative defense in an action brought for noncompliance with such technology based permit effluent limitations if the requirements of paragraph *"c"* of this condition are met. No determination made during administrative review of claims that noncompliance was caused by upset, and before an action for noncompliance, is final administrative action subject to judicial review.

(c) Conditions necessary for demonstration of an upset. A permittee who wishes to establish the affirmative defense of upset shall demonstrate through properly signed, contemporaneous operating logs, or other relevant evidence that;

(1) An upset occurred and that the permittee can identify the cause(s) of the upset.

(2) The permitted facility was at the time being properly operated; and

(3) The permittee submitted notice of the upset to the Department in accordance with 40 CFR 122.41(l)(6)(ii)(B).

(4) The permittee complied with any remedial measures required by Item #5 of the Standard Conditions of this permit.

(d) Burden of Proof. In any enforcement proceeding, the permittee seeking to establish the occurrence of an upset has the burden of proof.

20. FAILURE TO SUBMIT FEES

This permit may be revoked, in whole or in part, if the appropriate permit fees are not submitted within thirty (30) days of the date of notification that such fees are due.

21. BYPASSES

(a) Definition - Bypass means the intentional diversion of waste streams from any portion of a treatment facility.

(b) Prohibition of bypass, Bypass is prohibited and the department may take enforcement action against a permittee for bypass unless:

(1) Bypass was unavoidable to prevent loss of life, personal injury, or severe property damage;

(2) There were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate backup equipment should have been installed in the exercise of reasonable engineering judgement to prevent a bypass which occurred during normal periods of equipment downtime or preventive maintenance;

(3) The permittee submitted notices as required by paragraph *"d"* of this section.

(c) The Director may approve an anticipated bypass after considering its adverse effects if the Director determines that it will meet the three conditions listed above.

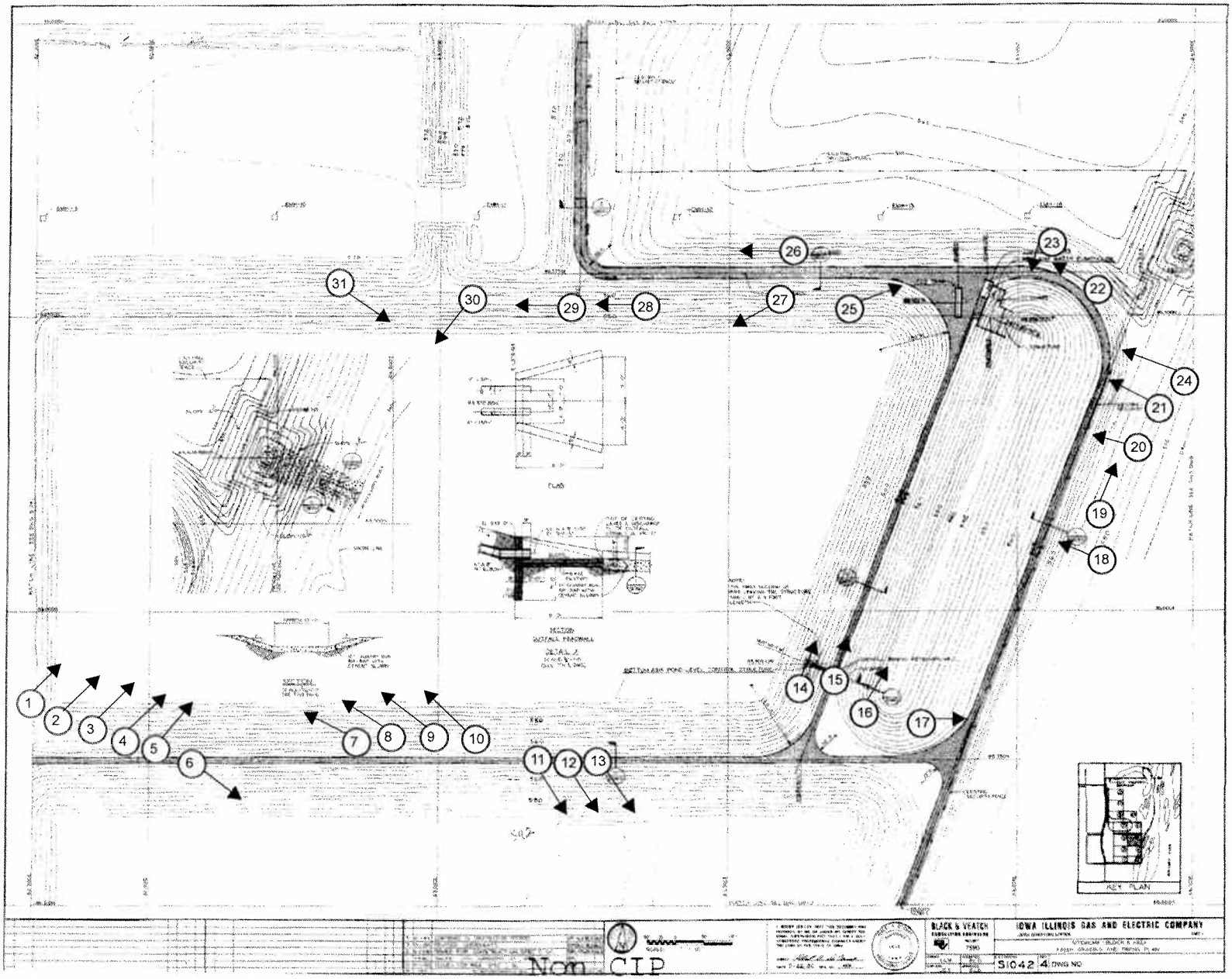
(d) Reporting bypasses. Bypasses shall be reported in accordance with 567-63.6 IAC.

22. SIGNATORY REQUIREMENTS

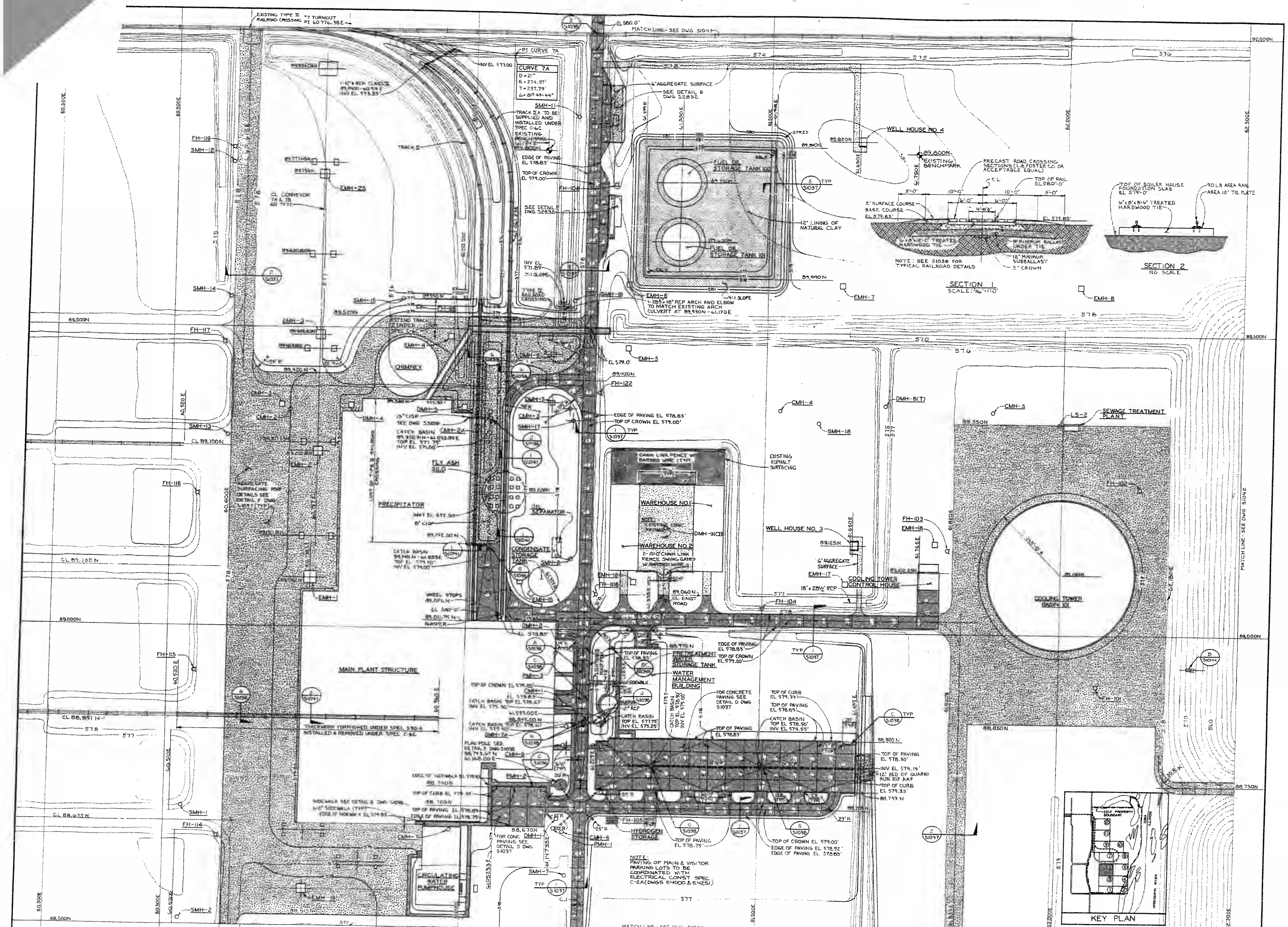
Applications, reports or other information submitted to the Department in connection with this permit must be signed and certified as required by 567-64.3(8) IAC.

23. USE OF CERTIFIED LABORATORIES

Effective October 1, 1996, analyses of wastewater, groundwater or sewage sludge that are required to be submitted to the department as a result of this permit must be performed by a laboratory certified by the State of Iowa. Routine, on-site monitoring for pH, temperature, dissolved oxygen, total residual chlorine and other pollutants that must be analyzed immediately upon sample collection, settleable solids, physical measurements, and operational monitoring tests specified in 567-63.3(4) are excluded from this requirement.



Louisa Bottom Ash Pond - Photo Log
September 15, 2010



REV	DATE	REVISIONS AND RECORD OF ISSUE
11	10-1-83	CONFORMED TO CONSTRUCTION RECORDS
10	8-19-82	ADDED LIGHTNING MAST FDN
9	4-29-81	GENERAL REVISIONS, SPEC C-6C
8	1-30-81	GENERAL REVISIONS - SPEC C-6C
7	11-12-80	ADDED NOTE
6	10-1-80	ADDED COORDINATE AT COOLING TOWER
5	8-8-80	GENERAL REVISIONS, SPEC C-6C
4	5-22-80	ISSUED FOR CONSTRUCTION, SPEC C-6C
3	4-2-80	GENERAL BID REVISION SPEC C-6C
2	3-21-80	ISSUED WITH ADDENDUM NO 2, SPEC C-6C
1	3-5-80	ISSUED WITH ADDENDUM NO. 1, SPEC C-6C
0	2-1-80	ISSUED FOR BIDS, SPEC C-6C

Non CIP

SCALE: 1" = 50'

I HEREBY CERTIFY THAT THIS DOCUMENT WAS PREPARED BY ME OR UNDER MY DIRECT PERSONAL SUPERVISION AND THAT I AM A DULY REGISTERED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF IOWA

SIGNED Robert A. DeCamp
DATE 5-22-80 REG. NO. 4938

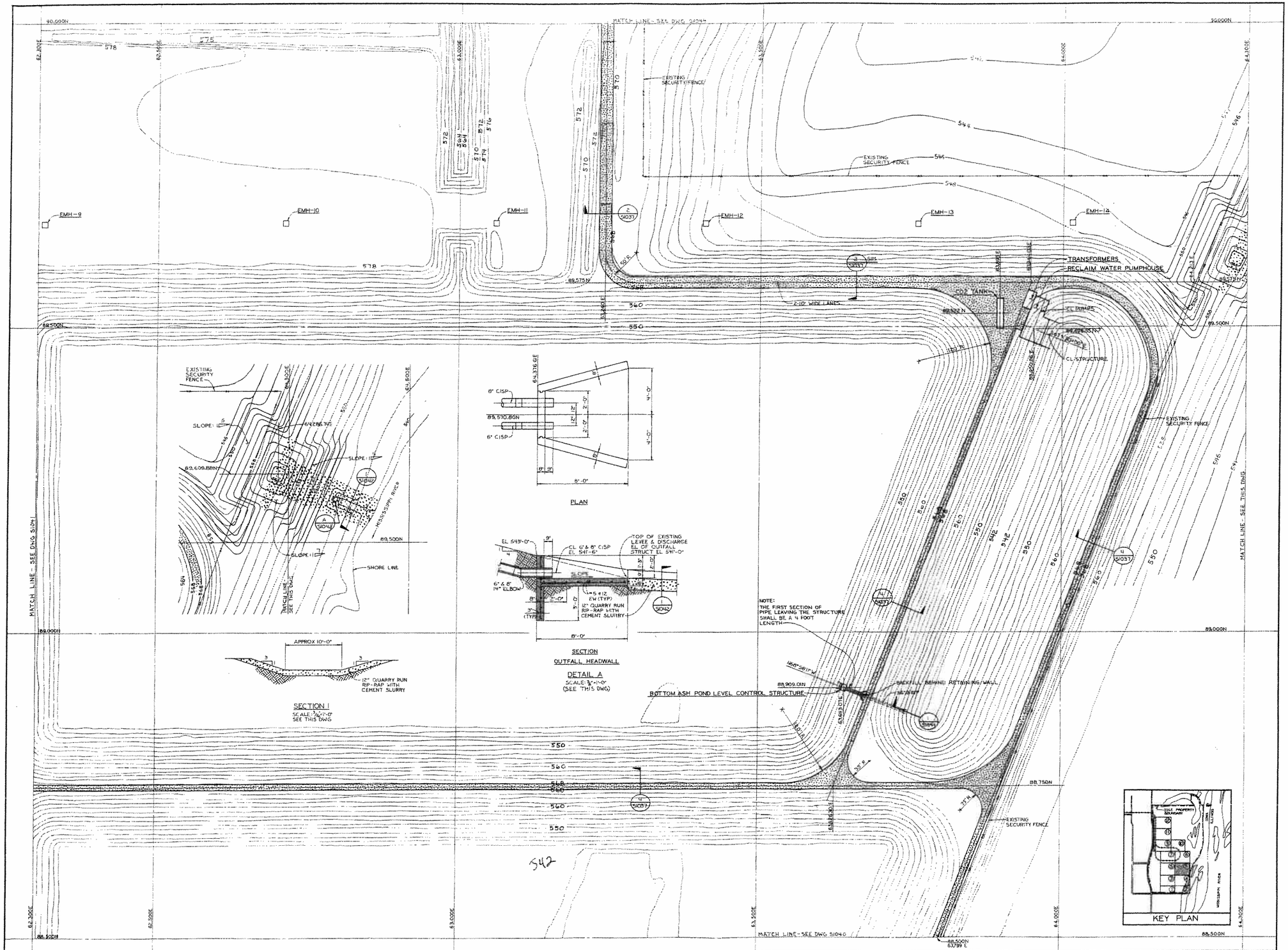
ROBERT A. DE CAMP REGISTERED 4938 IOWA PROFESSIONAL ENGINEER

BLACK & VEATCH
CONSULTING ENGINEERS
PROJECT 7590

IOWA ILLINOIS GAS AND ELECTRIC COMPANY
LOUISA GENERATING STATION
UNIT 1
SITEWORK - BLOCK 5 AREA
FINISH GRADING AND PAVING PLAN

DRAWN EGM | ACCEPTED BLD
CHECKED JDS | APPROVED BLD

B&V DWG NO. S1041 | REV 11 | DWG NO.



NO	DATE	REVISIONS AND RECORD OF ISSUE	BY	CHKD	APPD
4	10-1-85	CONFORMED TO CONSTRUCTION RECORDS	SPT	BLD	BLD
3	10-1-80	REVISED COORDINATE	SPT	BLD	BLD
2	9-22-80	ISSUED FOR CONSTRUCTION, SPEC C-66	SPT	BLD	BLD
1	9-9-80	ISSUED WITH ADDENDUM NO 1, SPEC C-66	SPT	BLD	BLD
0	6-11-80	ISSUED FOR BIDS, SPEC C-66	SPT	BLD	BLD

Non CIP

SCALE: 1" = 50'

I HEREBY CERTIFY THAT THIS DOCUMENT WAS PREPARED BY ME OR UNDER MY DIRECT PERSONAL SUPERVISION AND THAT I AM A DULY REGISTERED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF IOWA.

SIGNED _____ DATE 5-22-80 REG. NO. 4938

ROBERT A. DE GROOT REGISTERED PROFESSIONAL ENGINEER IOWA 4938

BLACK & VEATCH CONSULTING ENGINEERS

PROJECT 7590

DRAWN EGM CHECKED JOS ACCEPTED BLD APPROVED BLD

IOWA ILLINOIS GAS AND ELECTRIC COMPANY

LOUISA GENERATING STATION UNIT 1

SITEWORK - BLOCK 6 AREA

FINISH GRADING AND PAVING PLAN

B & V DWG NO S1042 REV 4 DWG NO.

Geotechnical Engineering Report

Preliminary Opinions of Global Stability
Ash Containment Pond Embankments
Louisa Generating Station
Louisa County, Iowa

October 15, 2010

Terracon Project No. 07105082

Prepared for:
HGM Associates, Inc.
Council Bluffs, Iowa

Prepared by:
Terracon Consultants, Inc.
Bettendorf, Iowa

Terracon

October 15, 2010

HGM Associates, Inc
640 5th Avenue
Council Bluffs, Iowa 51502

Attention: Mr. Terry Smith, P.E.

Re: Geotechnical Engineering Report
Preliminary Opinions of Global Stability
Ash Containment Pond Embankments
Louisa Generating Station
Louisa County, Iowa
Terracon Project No. 07105082

Dear Mr. Smith:

Terracon Consultants, Inc. (Terracon) conducted a limited subsurface exploration to obtain data concerning subsurface conditions for our use in performing limited global stability analyses of selected Ash Containment Pond embankments at the Louisa Generating Station (LGS) as described in our Proposal P07100280 dated September 27, 2010. This report presents the findings of the subsurface exploration and provides the results of our limited slope stability analyses. The limited scope of exploration and analyses is considered limited and cursory and is not intended to meet any particular regulatory guidelines, but rather to provide preliminary opinions regarding global stability.

We appreciate the opportunity to provide the limited geotechnical consulting services for this project and are prepared to provide more in-depth analyses as recommended in this report. Please contact us if you have any questions regarding this report.

Sincerely,

Terracon Consultants, Inc.

Vaughn Rupnow, P.E.
Iowa No. 19259

W. Ken Beck, P.E.
Iowa No. 10684

VER/WKB/N:\Projects\2010\07105082/07105082 Report.doc

Attachments

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Terracon

EXECUTIVE SUMMARY

Consultants to the EPA are currently conducting an audit of the ash containment pond located at the Louisa Generating Station (LGS) in Louisa County, Iowa. MidAmerican Energy Company (MEC) requested Terracon Consultants, Inc. (Terracon) conduct limited analyses of global stability of the earth embankments that surround the ash pond. Terracon understands this report will be provided to the EPA consultants to assist with their audit. Terracon conducted a limited subsurface exploration to obtain data concerning subsurface conditions for our use in performing the requested cursory global stability analyses of selected Ash Containment Pond embankments located at LGS. Five (5) borings (B-1 through B-5) were completed to depths of approximately 40 feet below the existing ground surface. Boring locations are shown on the Location Sketch in Appendix A. Laboratory tests were performed on the samples recovered from the borings.

This report presents the findings of the subsurface exploration and provides the results of our slope limited stability analyses. An abbreviated summary of findings, results, and recommendations are presented below. This report must be read in its entirety for a comprehensive understanding of our analyses and the limitations of this report.

- For this study, slope geometry was taken from survey cross sections supplied by HGM Associates, Inc. (HGM), and material strength properties were estimated from available laboratory testing conducted on a limited number of samples obtained from the exploratory borings. Subsurface geometry was based on conditions encountered at borings conducted along the crest of embankments. Piezometric surfaces were inferred based on elevations of static water surface levels in the ponds provided by HGM and short term water levels recorded at borings.

- Stability analyses were performed using the computer program Slide V5.0. Analyses searched for circular failure arcs on the upstream and downstream slope for the Steady Stage Seepage condition at the maximum pool elevations, and the phreatic lines within the levees were estimated for each model. Analyses were performed for Sections A and C for the flood event (Flood Elevation of 550 feet). For Section F, this analysis has not been performed since the toe is above the 550 foot elevation. According to the USGS, the peak ground acceleration is less than 0.10g for the 100-year earthquake at this site. Therefore, no seismic evaluation is required (EC 1110-2-6067 Paragraph 9h.6).

- The stability analysis results were compared with US Army Corps of Engineers (USACE) minimum requirements for earthen levees contained in Table 6.1b from USACE EM 1110-2-1913. Models of all analyzed embankment sections exhibit factors of safety greater than or equal to 1.4 for the steady state seepage conditions. The results are summarized in a table in Section 4.4 of this report.

Terracon

- Global stability of pond embankment slopes is dependent upon the specific subsurface conditions at the base of the embankment slopes. Without boring data at the toes of the embankments, conditions from the borings were used for the embankment toe; however, subsurface conditions could vary. Models do not reflect variations in stratigraphy or shear strength that may occur across an embankment cross-section. To determine actual conditions for analysis, additional borings should be performed at the toes of the levee slopes and samples should be obtained and tested so that analysis models can be developed which reflect actual subsurface conditions.

GEOTECHNICAL ENGINEERING REPORT
PRELIMINARY OPINIONS OF GLOBAL STABILITY
ASH CONTAINMENT POND EMBANKMENTS
LOUISA GENERATING STATION
LOUISA COUNTY, IOWA

Terracon Project No. 07105082
October 15, 2010

1.0 INTRODUCTION

Consultants to the EPA are currently conducting an audit of the ash containment pond located at the Louisa Generating Station (LGS) in Louisa County, Iowa. MidAmerican Energy Company (MEC) requested Terracon Consultants, Inc. (Terracon) conduct limited analyses of global stability of the earth embankments that surround the ash pond. Terracon understands this report will be provided to the EPA consultants to assist with their audit. Terracon conducted a limited subsurface exploration to obtain data concerning subsurface conditions for use in performing the requested cursory global stability analyses of selected Ash Containment Pond embankments located at LGS. Five (5) borings (B-1 through B-5) were completed to depths of approximately 40 feet below the existing ground surface. Logs of the borings along with a Boring Location Sketch are included in Appendix A of this report.

This study was performed in general accordance with our proposal number P07100280 dated September 27, 2010.

2.0 PROJECT INFORMATION

2.1 Project Description

	Description
Background	Consultants to the EPA are currently conducting an audit of the ash containment pond located at the Louisa Generating Station (RGS) in Muscatine, Iowa. MidAmerican Energy Company (MEC) requested Terracon conduct limited analyses of slope stability of the levees surrounding the ash pond. MEC will provide our report to the EPA consultant.

	Description
Limitations of this Study	Terracon performed a limited evaluation of the slope stability of the existing levees surrounding the ash containment ponds at the LGS facility. Due to the limited scope of exploration and short time period allowed for these analyses, this study is not comprehensive, nor intended to meet any specific regulatory guidelines, but rather a preliminary study. Opinions of global stability are based on simplified models developed as described in this report. In-depth analyses of embankment stability will require additional exploratory borings and laboratory tests, and should include analyses of underseepage.
Additional Information	On September 23, 2010, representatives of Terracon and MEC met at the site. Locations of the embankments/levees were selected and boring locations staked based on visual observations of current conditions. HGM provided survey cross-sections of the levees, extending into the pond area and beyond the toe on the opposite side from the pond.

2.2 Site Location and Description

Item	Description
Location	The ash containment pond at the Louisa plant is located east of the plant, not far from the Mississippi River.
Pond Descriptions	Terracon understands that the pond is utilized primarily for bottom ash disposal which is deposited in the ponds in a wet condition (sluiced). It is understood that LGS uses western coal and produces a class "C" fly ash which is commercially sold. According to the LGS drawings provided, the pond is about 42 acres in size and has a bottom elevation of 542 feet and an embankment/levee crest elevation of 568 feet. Based on our field observations, this pond appeared to be essential free of vegetation and in reasonable good condition with no apparent visible erosion channels or vector issues. It is understood that MEC inspects, maintains and makes repairs to the pond embankments on a periodic basis.

3.0 SUBSURFACE CONDITIONS

3.1 Typical Profile

Borings were conducted from the levee crest. Subsurface conditions encountered at the borings are described below:

Description	Approximate Depth to Bottom of Stratum	Material Encountered	Consistency/Density
Stratum 1 (Embankment Fill)	15 to 28½ feet	fine to medium sand, with ash	N/A
Stratum 2 [1] (Alluvium)	40 feet	fine to coarse sand (SP)	very loose to medium dense

1 extended to the termination depth of the borings

3.2 Water Level Observations

The boreholes were observed while drilling for the presence and level of groundwater. The water levels observed are noted on the attached boring logs, and are summarized below. Subsurface water levels could not be determined since water or drilling slurry was used to advance the boreholes. The boreholes were grouted after drilling using a cement-bentonite mixture. A relatively long period of time is necessary for a groundwater level to develop and stabilize in a borehole. Longer term monitoring in cased holes or piezometers would be required for a more accurate evaluation of the groundwater conditions.

	Observed Water Depth (ft) [1]	
Boring Number	While Drilling	After Drilling
1	28	NA
2	28	NA
3	28½	NA
4	28	NA
5	28	NA

[1] Below existing grade

Fluctuations of the water levels will occur due to fluctuations in the water level of the Mississippi River, the ash ponds, seasonal variations in the amount of rainfall and runoff, and other factors not evident at the time the borings were performed. Subsurface water levels during construction or at other times in the life of the structure will be higher or lower than the levels indicated in the boring logs. Perched water conditions can also develop overlying clay layers. The possibility of

groundwater level fluctuations and development of perched water conditions should be considered when developing the design and construction plans for the project.

4.0 GLOBAL STABILITY OF ASH POND EMBANKMENTS

4.1 Mechanics of Slope Stability

In slope stability analyses, the *Factor of Safety* is considered to be the sum of resisting forces (those forces which resist movement) divided by the sum of driving forces (those forces which promote movement). Therefore, for a slope to be stable, the resisting forces must be greater than the driving forces and their ratio, or Factor of Safety, must be greater than 1. The acceptable factor of safety for any particular slope depends upon many factors. Consequences of slope failure are one factor. The extent to which subsurface material properties and geometry are known is another very important factor.

Movements related to instability can occur rapidly or slowly. Analyses techniques are based on principles of mechanics. Input parameters include slope geometry, material strength, presence and orientation of discrete subsurface layers and water (piezometric) pressure.

For this study, slope geometry was taken from survey cross sections supplied by HGM, and material strength properties were estimated from available laboratory test data obtained by testing samples obtained from the limited number of exploratory borings. Subsurface geometry was based on conditions encountered at borings conducted along the crest of embankments. Piezometric surfaces were estimated based on elevations of static water surface levels in the ponds provided by HGM and short term water levels recorded at borings.

4.2 Selection of Embankment Sections for Analysis

Survey cross sections of the existing embankments at distinct locations were provided by HGM. Terracon selected three (3) of the provided cross sections for slope stability. Sections A, C, and F were modeled.

4.3 Subsurface Profile and Shear Strength Parameters

Data obtained from our exploratory borings, the topographical survey of the site, and laboratory tests, were used to constitute the slope models for performing global stability analyses of the existing embankments.

Borings were performed at the crest of the levees. The subsurface profiles for the analysis models were interpreted and extrapolated from the nearest boring. Since borings were only performed at the crest of the existing levees and no information was available regarding the conditions at the toe of the embankments, we considered that stratum elevations encountered at the borings or cone soundings represented a relatively level contact between strata.

The slope stability analyses utilized cohesion and friction angle values determined primarily from correlations with data from index tests performed on the samples recovered from borings and experience with similar soils. The shear strength parameters used in our analyses are summarized below:

Material	Saturated Unit Weight (pcf)	Effective Friction Angle (degrees)	Effective Cohesion (psf)
Embankment Fill Sand	120	28 to 32	0
Native Sand	120	26 to 28	0

4.4 Results of Analyses

Stability analyses were performed using the computer program Slide V5.0. Analyses searched for circular failure arcs on the upstream and downstream slope for the Steady Stage Seepage condition at the maximum pool elevations, and the phreatic lines within the levees were estimated for each model. Analyses were performed for Sections A and C for the flood event (Flood Elevation of 550 feet). For Section F, this analysis has not been performed since the toe is above the 550 foot elevation. According to the USGS, the peak ground acceleration is less than 0.10g for the 100-year earthquake at this site. Therefore, no seismic evaluation is required (EC 1110-2-6067 Paragraph 9h.6).

	Estimated Factor of Safety Obtained from Analysis [1]				
	Steady State Seepage			Steady State - Flood Event	
Section[2]	Required Minimum Factor of Safety [3]	Upstream	Downstream	Required Minimum Factor of Safety [3]	Downstream
A	1.4	1.9	1.4	1.4	1.4
C	1.4	2.6	1.7	1.4	1.9
F	1.4	2.1	1.7	-	-

1. Reported factors of safety are for deep seated circular "failure" surfaces that emerge near the levee crest. Computed factors of safety for shallow circular "failure" surfaces near the toe of the levee may be smaller.
2. Refer to Ash Pond Plan in Exhibit D-1, for cross section locations.
3. Reference: Table 6.1b from EM 1110-2-1913

Based on these limited analyses, the analyzed embankment section exhibits factors of safety greater than or equal to 1.4. Graphical results of the slope stability analyses for all cases are in Appendix D.

Global stability of pond embankment slopes is dependent upon subsurface conditions at the base of the embankment slopes. Without boring data at the toes of the embankments,

conditions at the toe were estimated from the crest borings. Our models do not reflect variations in stratigraphy or shear strength that typically occurs across an embankment section. To determine actual conditions accurately and precisely, additional borings should be performed at the toes of the levee slopes and samples should be obtained and tested to obtain actual conditions.

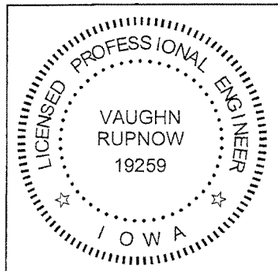
5.0 GENERAL COMMENTS

The limited global stability analyses presented in this report are based upon the data obtained from the borings performed at the indicated locations and from other information discussed in this report. The models for global stability analysis were developed using survey data provided by others. Subsurface stratigraphy for each model was extrapolated from nearby borings; actual conditions may be different and such differences would affect the results of our analyses. More in-depth analyses would require additional exploration and laboratory tests. This report does not reflect variations that may occur between borings, across the site, or due to the modifying effects of construction or weather. The nature and extent of such variations may not become evident without further exploration.

The scope of services for this project does not include either specifically or by implication any environmental or biological (e.g., mold, fungi, bacteria) assessment of the site or identification or prevention of pollutants, hazardous materials or conditions. If the owner is concerned about the potential for such contamination or pollution, other studies should be undertaken.

This report has been prepared for the exclusive use of our client for specific application to the project discussed and has been prepared in accordance with generally accepted geotechnical engineering practices. No warranties, either express or implied, are intended or made. Site safety, excavation support, and dewatering requirements are the responsibility of others. In the event that the actual embankment conditions are found to vary from the analyses models described in this report, the analyses and opinions expressed herein shall not be considered valid unless Terracon reviews the actual conditions and further verifies the analyses and opinions of this report in writing.

Terracon

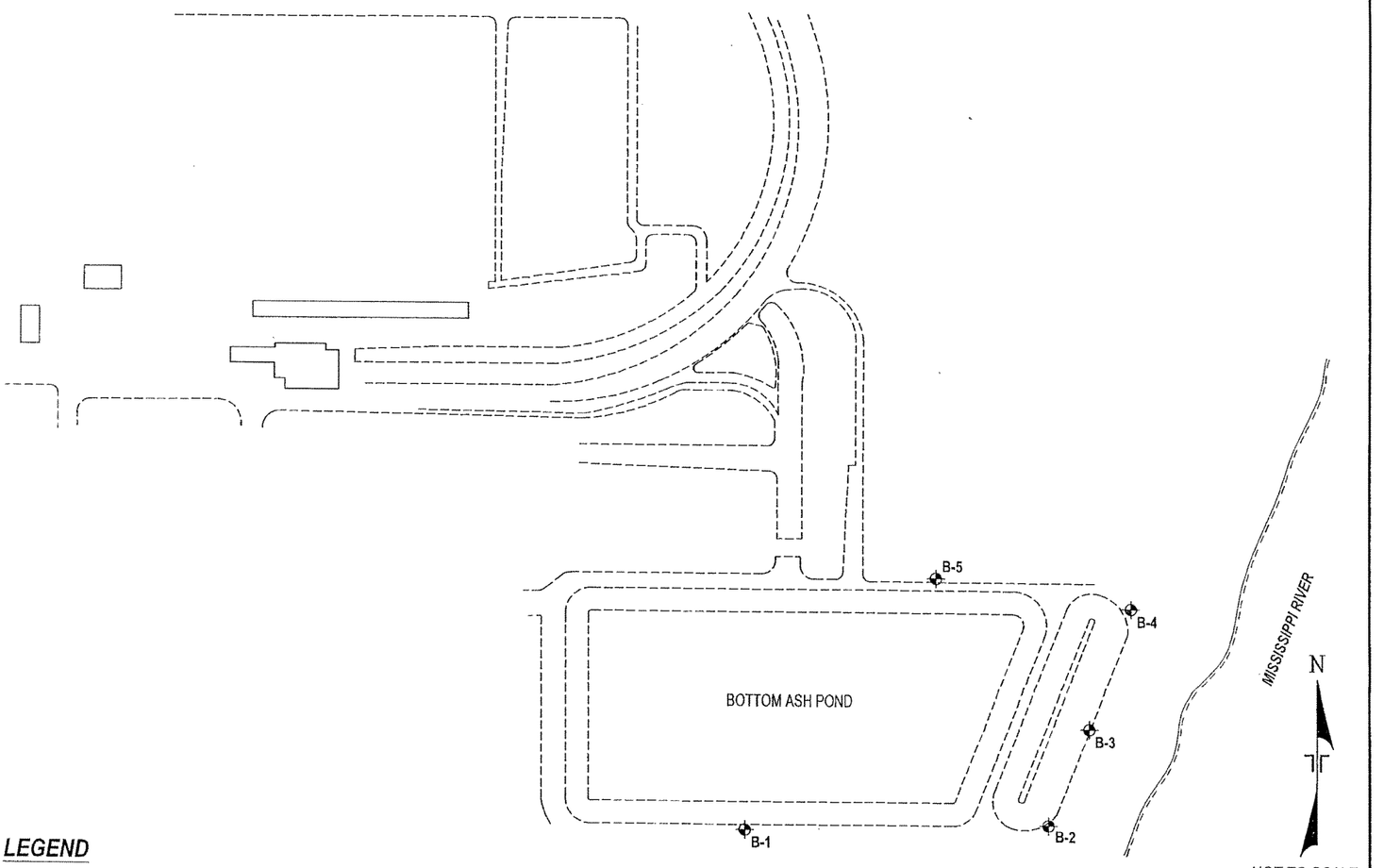


I hereby certify that this engineering document was prepared by me or under my direct personal supervision and that I am a duly licensed Professional Engineer under the laws of the State of Iowa.

Vaughn Rupnow, P.E. — Date: 10/15/2010

My license renewal date is December 31, 2010.

APPENDIX A
FIELD EXPLORATION



NOT TO SCALE

LEGEND

APPROXIMATE BORING LOCATION

THIS DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

Project Mngr:	WKB
Drawn By:	DWD
Checked By:	WKB/MRF
Approved By:	WKB

Project No.	07105082
Scale:	AS SHOWN
File No.	GEO07105082-1
Date:	OCT. 2010

Terracon
Consulting Engineers and Scientists
870 40th Avenue (563) 355-0702
Bettendorf, Iowa 52722 (563) 355-4789

BORING LOCATION SKETCH
ASH CONTAINMENT POND
LOUISA GENERATING STATION
LOUISA COUNTY, IOWA

EXHIBIT
A-1

BORING NO. 1

CLIENT: HGM Associates, Inc.

SITE: Louisa Generating Station, Louisa County, Iowa

PROJECT: Ash Containment Pond

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY, in.	SAMPLES SPT - N ** BLOWS / ft.	TESTS WATER CONTENT, %	TESTS DRY UNIT WT pcf	TESTS UNCONFINED STRENGTH, psf
	Approx. Surface Elev.: 566 ft									
	FILL, FINE TO MEDIUM SAND Brown				HS					
				1	SS	14	4	5		
					HS					
				2	SS	16	12	4		
		5			HS					
				3	SS	14	11	5		
					HS					
				4	SS	18	11	5		
		10			HS					
	15 551			5	SS	18	13	6		
	FINE TO MEDIUM SAND (ALLUVIUM) Brown Loose	15			HS					
			SP	6	SS	18	4	5		
		20			HS					
			SP	7	SS	14	8	6		
		25			HS					
			SP	8	SS	16	8	5		
		30			HS					

Continued Next Page

The stratification lines represent the approximate boundary lines between soil and rock types: In-situ, the transition may be gradual.

*Pocket Penetrometer
**CME 140 lb. SPT automatic hammer

WATER LEVEL OBSERVATIONS, ft			
WL	▽ 28	WD	▼
WL	▼		▼
WL			

Terracon

BORING STARTED	9-30-10		
BORING COMPLETED	9-30-10		
RIG	550	FOREMAN	SS
APPROVED	VER	JOB #	07105082

BOREHOLE 99 BORING LOGS.GPJ TERRACON.GDT 10/13/10

BORING NO. 1

CLIENT: HGM Associates, Inc.

SITE: Louisa Generating Station, Louisa County, Iowa

PROJECT: Ash Containment Pond

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY, in.	SAMPLES SPT - N ** BLOWS / ft.	TESTS WATER CONTENT, %	TESTS DRY UNIT WT pcf	TESTS UNCONFINED STRENGTH, psf
	33.5 532.5									
	MEDIUM TO COARSE SAND (ALLUVIUM) Brown Very Loose to Loose		SP	9	SS	18	3	21		
		35			HS					
			SP	10	SS	18	9	21		
	40 526	40								
	BOTTOM OF BORING									

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

*Pocket Penetrometer
**CME 140 lb. SPT automatic hammer

WATER LEVEL OBSERVATIONS, ft			
WL	▽ 28	WD	▼
WL	▼		▼
WL			

Terracon

BORING STARTED			9-30-10
BORING COMPLETED			9-30-10
RIG	550	FOREMAN	SS
APPROVED	VER	JOB #	07105082

BOREHOLE 99 BORING LOGS.GPJ TERRACON.GDT 10/13/10

Exhibit A-2

BORING NO. 2

CLIENT: **HGM Associates, Inc.**

SITE: **Louisa Generating Station**
Louisa County, Iowa

PROJECT: **Ash Containment Pond**

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY, in.	SAMPLES SPT - N ** BLOWS / ft.	TESTS WATER CONTENT, %	TESTS DRY UNIT WT pcf	TESTS UNCONFINED STRENGTH, psf
	Approx. Surface Elev.: 567 ft									
	FILL, FINE TO MEDIUM SAND Brown				HS					
				1	SS	18	7	2		
					HS					
				2	SS	18	15	6		
		5			HS					
				3	SS	18	15	5		
					HS					
				4	SS	12	10	6		
		10			HS					
				5	SS	14	17	4		
		15			HS					
				6	SS	14	17	4		
		20			HS					
				7	SS	16	16	4		
		25			HS					
	28.5 ▽ 538.5									
	MEDIUM TO COARSE SAND, TRACE GRAVEL (ALLUVIAL) Brown Loose		SP	8	SS	8	8	16		
		30			HS					

Continued Next Page

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

*Pocket Penetrometer
**CME 140 lb. SPT automatic hammer

WATER LEVEL OBSERVATIONS, ft			
WL	▽ 28	WD	▼
WL	▼		▼
WL			

Terracon

BORING STARTED			9-30-10
BORING COMPLETED			9-30-10
RIG	550	FOREMAN	SS
APPROVED	VER	JOB #	07105082

BOREHOLE 99 BORING LOGS.GPJ TERRACON.GDT 10/13/10

BORING NO. 2

CLIENT: HGM Associates, Inc.

SITE: Louisa Generating Station, Louisa County, Iowa

PROJECT: Ash Containment Pond

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY, in.	SAMPLES SPT - N ** BLOWS / ft.	TESTS WATER CONTENT, %	TESTS DRY UNIT WT pcf	TESTS UNCONFINED STRENGTH, psf
	MEDIUM TO COARSE SAND, TRACE GRAVEL (ALLUVIUM) Brown Loose Medium dense at Samples 9 and 10	35	SP	9	SS	16	16	19		
					HS					
		40	SP	10	SS	16	13	16		
	BOTTOM OF BORING	527								

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

*Pocket Penetrometer
**CME 140 lb. SPT automatic hammer

WATER LEVEL OBSERVATIONS, ft			
WL	▽ 28	WD	▼
WL	▼		▼
WL			

Terracon

BORING STARTED	9-30-10		
BORING COMPLETED	9-30-10		
RIG	550	FOREMAN	SS
APPROVED	VER	JOB #	07105082

BOREHOLE_99 BORING LOGS.GPJ TERRACON.GDT 10/13/10

Exhibit A-3

BORING NO. 3

CLIENT: HGM Associates, Inc.

SITE: Louisa Generating Station, Louisa County, Iowa

PROJECT: Ash Containment Pond

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY, in.	SAMPLES SPT - N ** BLOWS / ft.	TESTS WATER CONTENT, %	TESTS DRY UNIT WT pcf	TESTS UNCONFINED STRENGTH, psf
	Approx. Surface Elev.: 567 ft									
	FILL, FINE TO MEDIUM SAND Brown				HS					
				1	SS	14	18	4		
					HS					
				2	SS	16	35	5		
		5			HS					
				3	SS	18	18	8		
					HS					
				4	SS	18	18	6		
		10			HS					
				5	SS	18	17	5		
		15			HS					
				6	SS	16	22	5		
		20			HS					
	23.5 543.5			7	SS	14	7	5		
	MEDIUM TO COARSE SAND (ALLUVIUM) Brown Loose to Medium Dense	25			HS					
	Very loose at Sample 8 (disturbance) ▽		SP	8	SS	12	WOH	18		
		30			HS					

Continued Next Page

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

*Pocket Penetrometer
**CME 140 lb. SPT automatic hammer

WATER LEVEL OBSERVATIONS, ft			
WL	▽ 28.5	WD	▼
WL	▼		▼
WL			

Terracon

BORING STARTED	9-30-10		
BORING COMPLETED	9-30-10		
RIG	550	FOREMAN	SS
APPROVED	VER	JOB #	07105082

BOREHOLE 99 BORING LOGS.GPJ TERRACON.GDT 10/13/10

BORING NO. 3

CLIENT: HGM Associates, Inc.

SITE: Louisa Generating Station, Louisa County, Iowa

PROJECT: Ash Containment Pond

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY, in.	SAMPLES SPT - N ** BLOWS / ft.	TESTS WATER CONTENT, %	TESTS DRY UNIT WT pcf	TESTS UNCONFINED STRENGTH, psf
	MEDIUM TO COARSE SAND (ALLUVIUM) Brown Loose to Medium Dense	35	SP	9	SS	18	14	15		
					HS					
		40	SP	10	SS	18	6	15		
	BOTTOM OF BORING 527 WOH = Weight of Hammer									

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

*Pocket Penetrometer
**CME 140 lb. SPT automatic hammer

WATER LEVEL OBSERVATIONS, ft			
WL	▽ 28.5	WD	▼
WL	▼		▼
WL			

Terracon

BORING STARTED			9-30-10
BORING COMPLETED			9-30-10
RIG	550	FOREMAN	SS
APPROVED	VER	JOB #	07105082

BOREHOLE 99 BORING LOGS.GPJ TERRACON.GDT 10/13/10

Exhibit A-4

BORING NO. 4

CLIENT: HGM Associates, Inc.

SITE: Louisa Generating Station, Louisa County, Iowa

PROJECT: Ash Containment Pond

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY, in.	SAMPLES SPT - N ** BLOWS / ft.	TESTS WATER CONTENT, %	TESTS DRY UNIT WT pcf	TESTS UNCONFINED STRENGTH, psf
	Approx. Surface Elev.: 567 ft									
	FILL, FINE TO MEDIUM SAND Brown				HS					
				1	SS	14	20	6		
					HS					
				2	SS	16	27	4		
		5			HS					
				3	SS	16	23	3		
					HS					
				4	SS	18	13	5		
		10			HS					
				5	SS	18	17	4		
		15			HS					
	Silty sand at Sample 6			6	SS	18	33	6		
		20			HS					
				7	SS	14	14	5		
		25			HS					
	28.5 ▽ 538.5									
	MEDIUM SAND (ALLUVIUM) Brown Loose		SP	8	SS	7	7	18		
		30			HS					

Continued Next Page

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

*Pocket Penetrometer
**CME 140 lb. SPT automatic hammer

WATER LEVEL OBSERVATIONS, ft			
WL	▽ 28	WD	▼
WL	▼		▼
WL			

Terracon

BORING STARTED	9-30-10		
BORING COMPLETED	9-30-10		
RIG	550	FOREMAN	SS
APPROVED	VER	JOB #	07105082

BOREHOLE 99 BORING LOGS.GPJ TERRACON.GDT 10/13/10

BORING NO. 4

CLIENT: HGM Associates, Inc.

SITE: Louisa Generating Station, Louisa County, Iowa

PROJECT: Ash Containment Pond

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY, in.	SAMPLES SPT - N ** BLOWS / ft.	TESTS WATER CONTENT, %	TESTS DRY UNIT WT pcf	TESTS UNCONFINED STRENGTH, psf
	MEDIUM SAND (ALLUVIUM)									
	Brown									
	Loose		SP	9	SS	4	4	21		
		35			HS					
	Medium dense at Sample 10		SP	10	SS	18	14	18		
	40 527	40								
	BOTTOM OF BORING									

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

*Pocket Penetrometer
**CME 140 lb. SPT automatic hammer

WATER LEVEL OBSERVATIONS, ft			
WL	▽ 28	WD	▼
WL	▼		▼
WL			

Terracon

BORING STARTED			9-30-10
BORING COMPLETED			9-30-10
RIG	550	FOREMAN	SS
APPROVED	VER	JOB #	07105082

BORENICLE 99 BORING LOGS.GPJ TERRACON.GDT 10/13/10

Exhibit A-5

BORING NO. 5

CLIENT: HGM Associates, Inc.

SITE: Louisa Generating Station, Louisa County, Iowa

PROJECT: Ash Containment Pond

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY, in.	SAMPLES SPT - N ** BLOWS / ft.	TESTS WATER CONTENT, %	TESTS DRY UNIT WT pcf	TESTS UNCONFINED STRENGTH, psf
	Approx. Surface Elev.: 567 ft									
	FILL, FINE SAND WITH ASH Brown				HS					
				1	SS	18	20	4		
					HS					
				2	SS	16	24	6		
		5			HS					
	6.5 560.5									
	FILL, FINE TO MEDIUM SAND Brown			3	SS	10	28	4		
					HS					
				4	SS	18	22	5		
		10			HS					
				5	SS	18	26	9		
		15			HS					
				6	SS	18	30	4		
		20			HS					
				7	SS	18	22	4		
		25			HS					
	28.5 ▽ 538.5									
	FINE TO MEDIUM SAND (ALLUVIUM) Brown Loose		SP	8	SS	18	4	23		
		30			HS					
	32.5 534.5									

Continued Next Page

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

*Pocket Penetrometer
**CME 140 lb. SPT automatic hammer

WATER LEVEL OBSERVATIONS, ft			
WL	▽ 28	WD	▼
WL	▼		▼
WL			

Terracon

BORING STARTED	9-30-10		
BORING COMPLETED	9-30-10		
RIG	550	FOREMAN	SS
APPROVED	VER	JOB #	07105082

BOREHOLE 99 BORING LOGS.GPJ TERRACON.GDT 10/13/10

BORING NO. 5

CLIENT **HGM Associates, Inc.**

SITE **Louisa Generating Station**
Louisa County, Iowa

PROJECT
Ash Containment Pond

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY, in.	SAMPLES SPT - N ** BLOWS / ft.	TESTS WATER CONTENT, %	TESTS DRY UNIT WT pcf	TESTS UNCONFINED STRENGTH, psf
	FINE TO MEDIUM SAND (ALLUVIUM) Brown Loose Fat clay layer at Sample 9	35	CH	9	SS	18	6	31		
					HS					
	Medium to coarse sand at Sample 10	40	SP	10	SS	18	8	15		
	40 527 BOTTOM OF BORING									

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

*Pocket Penetrometer
**CME 140 lb. SPT automatic hammer

WATER LEVEL OBSERVATIONS, ft			
WL	▽ 28	WD	▼
WL	▼		▼
WL			

Terracon

BORING STARTED			9-30-10
BORING COMPLETED			9-30-10
RIG	550	FOREMAN	SS
APPROVED	VER	JOB #	07105082

BOREHOLE 99 BORING LOGS.GPJ TERRACON.GDT 10/13/10

Exhibit A-6

Terracon

Field Exploration Description

The borings were performed at the locations selected by Terracon and MEC as shown on the attached Boring Location Sketch (Exhibit A-1). Ground surface elevations indicated on the boring logs are approximate and have been rounded to the nearest foot. The elevations were estimated from the levee cross sections provided by HGM. The elevations of the soil borings should be considered accurate only to the degree implied by the means and methods used to define them.

The borings were advanced with a track-mounted drilling rig utilizing continuous flight hollow-stem augers to advance the boreholes. Representative soil samples were obtained using a split-barrel sampling procedure in which a standard 2-inch (outside diameter) split-barrel sampling spoon is driven into the ground with a 140-pound Central Mine Equipment (CME) automatic SPT hammer falling a distance of 30 inches. The number of blows required to advance the sampling spoon the last 12 inches of a normal 18-inch penetration is recorded as the Standard Penetration Test (SPT) resistance value and are provided on the boring logs at their depths of occurrence. The blow counts, also referred to as SPT N-values are used to help estimate the relative density of granular soils and the consistency of cohesive soils. The samples were transported to our laboratory for testing and classification. The boreholes were grouted with a cement-bentonite slurry.

The drill crew prepared a field log for each boring. Each log included visual classifications of the materials encountered during drilling as well as the driller's interpretation of the subsurface conditions between samples. The boring logs included with this report represent an interpretation of the field logs and include modifications based on laboratory observation and tests of the samples.

APPENDIX B
LABORATORY TESTING

Terracon

Laboratory Testing

The samples obtained from the borings were tested in our laboratory to determine their water contents. The soil samples were classified in the laboratory based on visual observation, texture and plasticity. The soil descriptions and estimated group symbols presented on the boring logs for native soils are in general accordance with the Unified Soil Classification System (USCS) and the attached General Notes. A summary of the USCS is also attached.

APPENDIX C

SUPPORTING DOCUMENTS

GENERAL NOTES

DRILLING & SAMPLING SYMBOLS:

SS:	Split Spoon – 1-$^3/_8$" I.D., 2" O.D., unless otherwise noted	HS:	Hollow Stem Auger
ST:	Thin-Walled Tube - 3" O.D., unless otherwise noted	PA:	Power Auger
RS:	Ring Sampler - 2.42" I.D., 3" O.D., unless otherwise noted	HA:	Hand Auger
DB:	Diamond Bit Coring - 4", N, B	RB:	Rock Bit
BS:	Bulk Sample or Auger Sample	WB:	Wash Boring or Mud Rotary

The number of blows required to advance a standard 2-inch O.D. split-spoon sampler (SS) the last 12 inches of the total 18-inch penetration with a 140-pound hammer falling 30 inches is considered the "Standard Penetration" or "N-value".

WATER LEVEL MEASUREMENT SYMBOLS:

WL:	Water Level	WS:	While Sampling	N/E:	Not Encountered
WCI:	Wet Cave in	WD:	While Drilling		
DCI:	Dry Cave in	BCR:	Before Casing Removal		
AB:	After Boring	ACR:	After Casing Removal		

Water levels indicated on the boring logs are the levels measured in the borings at the times indicated. Groundwater levels at other times and other locations across the site could vary. In pervious soils, the indicated levels may reflect the location of groundwater. In low permeability soils, the accurate determination of groundwater levels may not be possible with only short-term observations.

DESCRIPTIVE SOIL CLASSIFICATION: Soil classification is based on the Unified Classification System. Coarse Grained Soils have more than 50% of their dry weight retained on a #200 sieve; their principal descriptors are: boulders, cobbles, gravel or sand. Fine Grained Soils have less than 50% of their dry weight retained on a #200 sieve; they are principally described as clays if they are plastic, and silts if they are slightly plastic or non-plastic. Major constituents may be added as modifiers and minor constituents may be added according to the relative proportions based on grain size. In addition to gradation, coarse-grained soils are defined on the basis of their in-place relative density and fine-grained soils on the basis of their consistency.

CONSISTENCY OF FINE-GRAINED SOILS

Unconfined Compressive Strength, Qu, psf	Standard Penetration or N-value (SS) Blows/Ft.	Consistency
< 500	0-1	Very Soft
500 – 1,000	2-4	Soft
1,001 – 2,000	4-8	Medium Stiff
2,001 – 4,000	8-15	Stiff
4,001 – 8,000	15-30	Very Stiff
8,000+	> 30	Hard

RELATIVE DENSITY OF COARSE-GRAINED SOILS

Standard Penetration or N-value (SS) Blows/Ft.	Ring Sampler (RS) Blows/Ft.	Relative Density
0 – 3	0-6	Very Loose
4 – 9	7-18	Loose
10 – 29	19-58	Medium Dense
30 – 49	59-98	Dense
> 50	> 99	Very Dense

RELATIVE PROPORTIONS OF SAND AND GRAVEL

Descriptive Term(s) of other Constituents	Percent of Dry Weight
Trace	< 15
With	15 – 29
Modifier	> 30

GRAIN SIZE TERMINOLOGY

Major Component of Sample	Particle Size
Boulders	Over 12 in. (300mm)
Cobbles	12 in. to 3 in. (300mm to 75 mm)
Gravel	3 in. to #4 sieve (75mm to 4.75 mm)
Sand	#4 to #200 sieve (4.75mm to 0.075mm)
Silt or Clay	Passing #200 Sieve (0.075mm)

RELATIVE PROPORTIONS OF FINES

Descriptive Term(s) of other Constituents	Percent of Dry Weight
Trace	< 5
With	5 – 12
Modifiers	> 12

PLASTICITY DESCRIPTION

Term	Plasticity Index
Non-plastic	0
Low	1-10
Medium	11-30
High	> 30

UNIFIED SOIL CLASSIFICATION SYSTEM

Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests [A]					Soil Classification	
					Group Symbol	Group Name [B]
Coarse Grained Soils: More than 50% retained on No. 4 sieve	**Gravels:** More than 50% of coarse fraction retained on No. 4 sieve	**Clean Gravels:** Less than 5% fines [C]	$Cu \geq 4$ and $1 \leq Cc \leq 3$ [E]		GW	Well-graded gravel [F]
			$Cu < 4$ and/or $1 > Cc > 3$ [E]		GP	Poorly graded gravel [F]
		Gravels with Fines: More than 12% fines [C]	Fines classify as ML or MH		GM	Silty gravel [F,G,H]
			Fines classify as CL or CH		GC	Clayey gravel [F,G,H]
	Sands: 50% or more of coarse fraction passes No. 4 sieve	**Clean Sands:** Less than 5% fines [D]	$Cu \geq 6$ and $1 \leq Cc \leq 3$ [E]		SW	Well-graded sand [I]
			$Cu < 6$ and/or $1 > Cc > 3$ [E]		SP	Poorly graded sand [I]
		Sands with Fines: More than 12% fines [D]	Fines classify as ML or MH		SM	Silty sand [G,H,I]
			Fines Classify as CL or CH		SC	Clayey sand [G,H,I]
Fine-Grained Soils: 50% or more passes the No. 200 sieve	**Silts and Clays:** Liquid limit less than 50	**Inorganic:**	PI > 7 and plots on or above "A" line [J]		CL	Lean clay [K,L,M]
			PI < 4 or plots below "A" line [J]		ML	Silt [K,L,M]
		Organic:	Liquid limit - oven dried	< 0.75	OL	Organic clay [K,L,M,N]
			Liquid limit - not dried			Organic silt [K,L,M,O]
	Silts and Clays: Liquid limit 50 or more	**Inorganic:**	PI plots on or above "A" line		CH	Fat clay [K,L,M]
			PI plots below "A" line		MH	Elastic Silt [K,L,M]
		Organic:	Liquid limit - oven dried	< 0.75	OH	Organic clay [K,L,M,P]
			Liquid limit - not dried			Organic silt [K,L,M,Q]
Highly organic soils:	Primarily organic matter, dark in color, and organic odor				PT	Peat

[A] Based on the material passing the 3-in. (75-mm) sieve

[B] If field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.

[C] Gravels with 5 to 12% fines require dual symbols: GW-GM well-graded gravel with silt, GW-GC well-graded gravel with clay, GP-GM poorly graded gravel with silt, GP-GC poorly graded gravel with clay.

[D] Sands with 5 to 12% fines require dual symbols: SW-SM well-graded sand with silt, SW-SC well-graded sand with clay, SP-SM poorly graded sand with silt, SP-SC poorly graded sand with clay

[E] $Cu = D_{60}/D_{10}$ $Cc = \dfrac{(D_{30})^2}{D_{10} \times D_{60}}$

[F] If soil contains ≥ 15% sand, add "with sand" to group name.

[G] If fines classify as CL-ML, use dual symbol GC-GM, or SC-SM.

[H] If fines are organic, add "with organic fines" to group name.

[I] If soil contains ≥ 15% gravel, add "with gravel" to group name.

[J] If Atterberg limits plot in shaded area, soil is a CL-ML, silty clay.

[K] If soil contains 15 to 29% plus No. 200, add "with sand" or "with gravel," whichever is predominant.

[L] If soil contains ≥ 30% plus No. 200 predominantly sand, add "sandy" to group name.

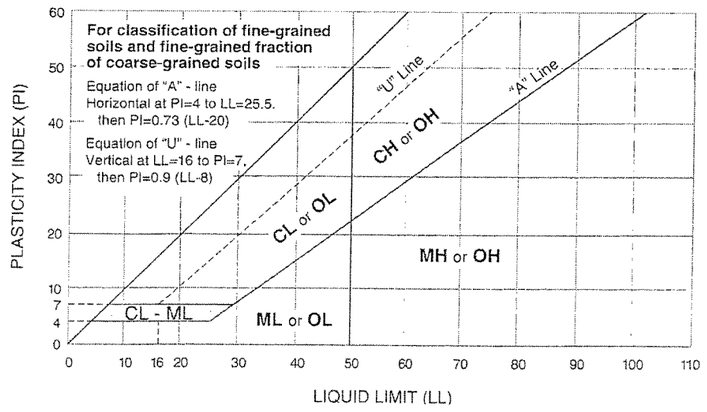
[M] If soil contains ≥ 30% plus No. 200, predominantly gravel, add "gravelly" to group name.

[N] PI ≥ 4 and plots on or above "A" line.

[O] PI < 4 or plots below "A" line.

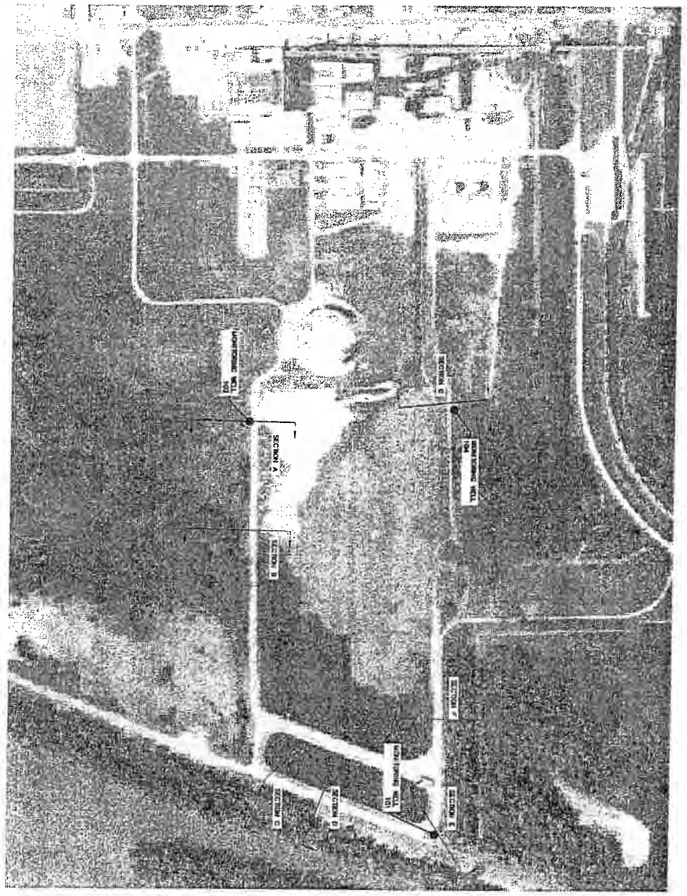
[P] PI plots on or above "A" line.

[Q] PI plots below "A" line.



APPENDIX D

Slope Stability Analyses



project no. 112510
sheet 1 OF 2

project LOUISA IMPOUNDMENT PONDS
BERM STABILITY

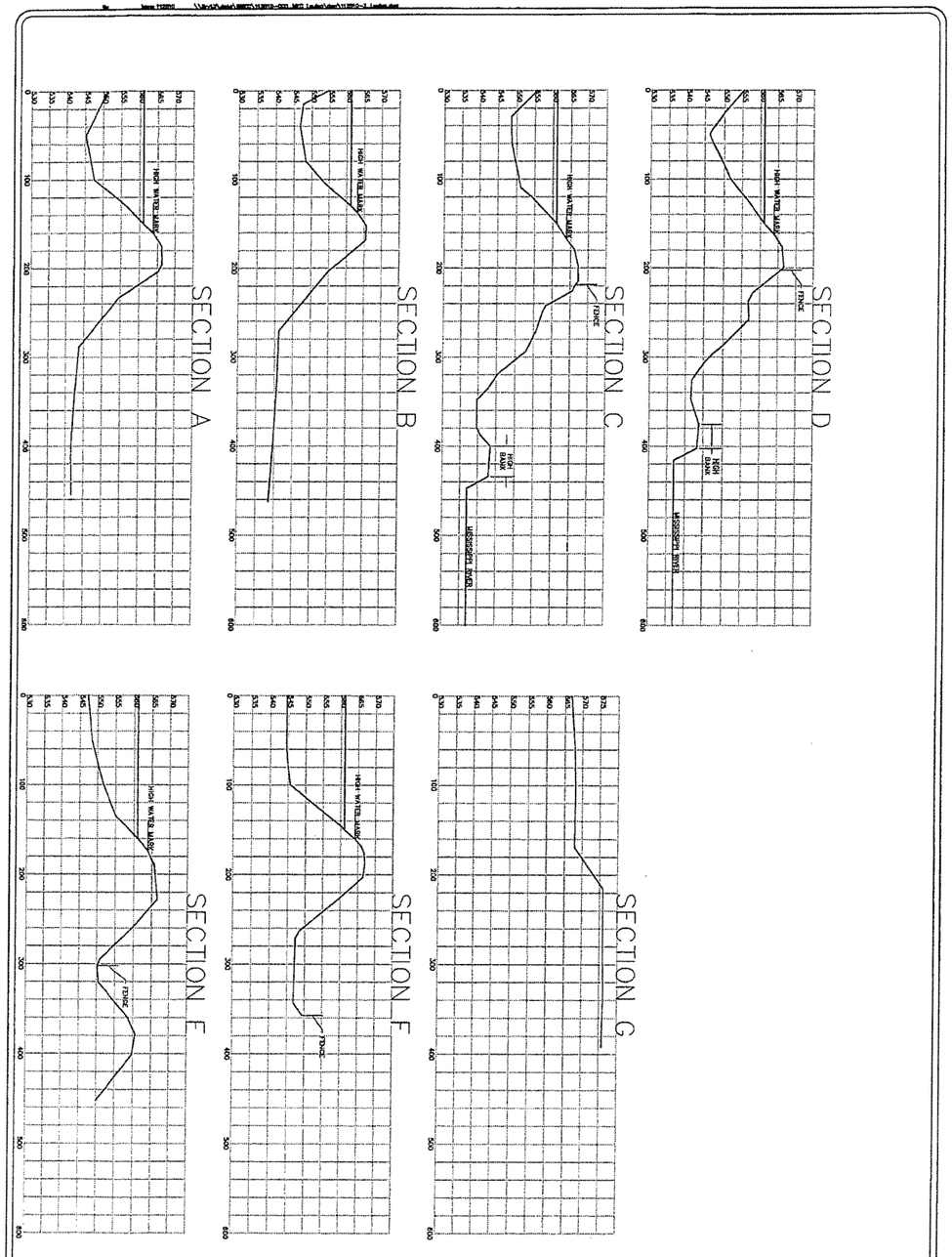
client MIDAMERICAN ENERGY COMPANY
7215 NAVAJO STREET, COUNCIL BLUFFS, IOWA 51501

sheet SITE PLAN

DEC drawn
DRT designed
TLS approved
SEPT '10 date
revision date

hgm
ASSOCIATES INC.
640 FIFTH AVENUE COUNCIL BLUFFS, IOWA
PHONE: (712) 323-0530

Exhibit D-1



project LOUISA IMPOUNDMENT PONDS
SIGNA STABILITY

client MIDAMERICAN ENERGY COMPANY
7215 NAVAJO STREET, COUNCIL BLUFFS, IOWA 51501

sheet CROSS SECTIONS

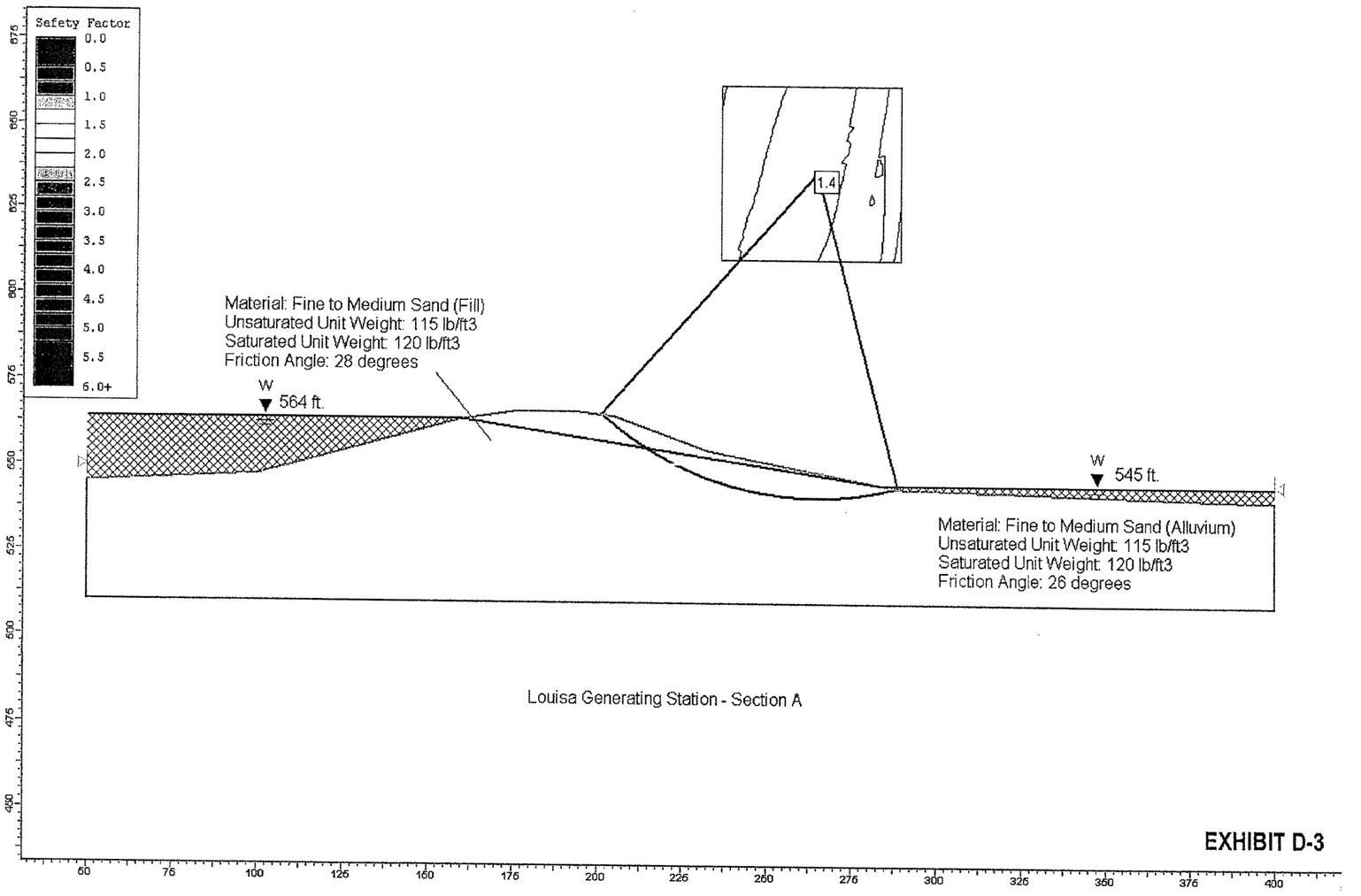
project no. 112510

sheet 2 OF 2

DEF. drawn
DEF. designed
TLS approved
SEPT.'10 date

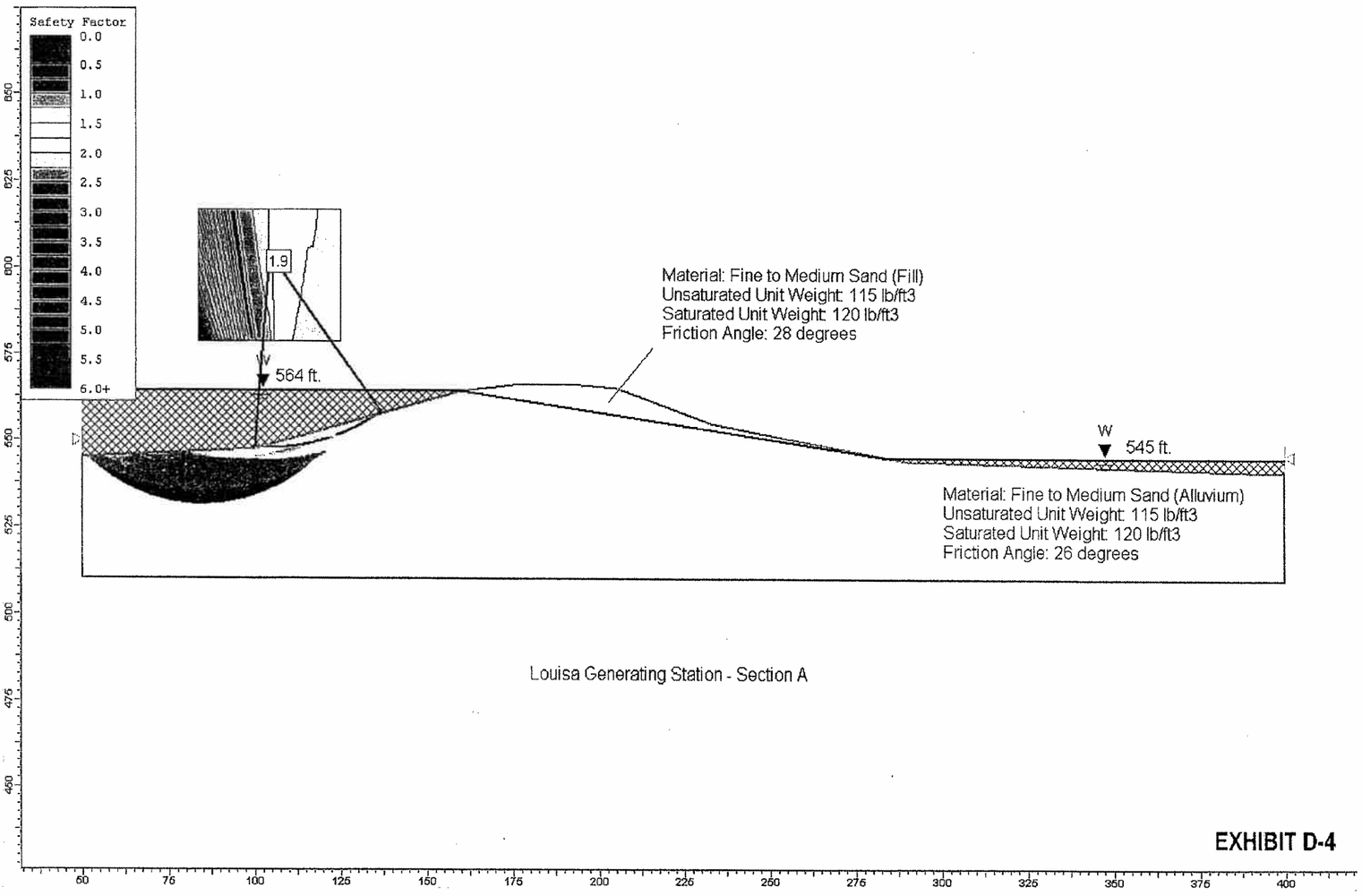
hgm ASSOCIATES INC.
640 FIFTH AVENUE COUNCIL BLUFFS, IOWA
PHONE: (712) 323-0530

Exhibit D-2



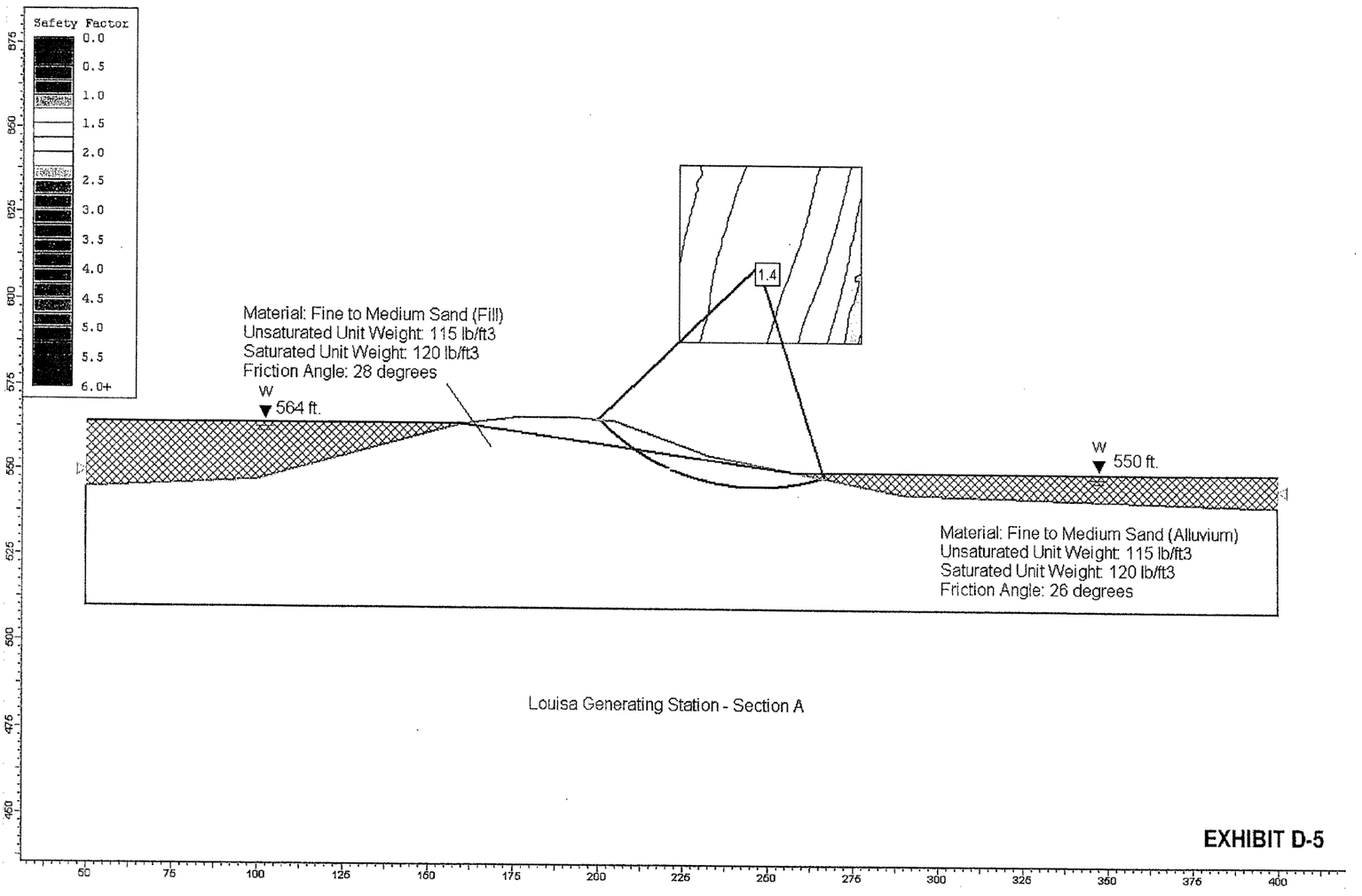
Louisa Generating Station - Section A

EXHIBIT D-3



Louisa Generating Station - Section A

EXHIBIT D-4



Louisa Generating Station - Section A

EXHIBIT D-5

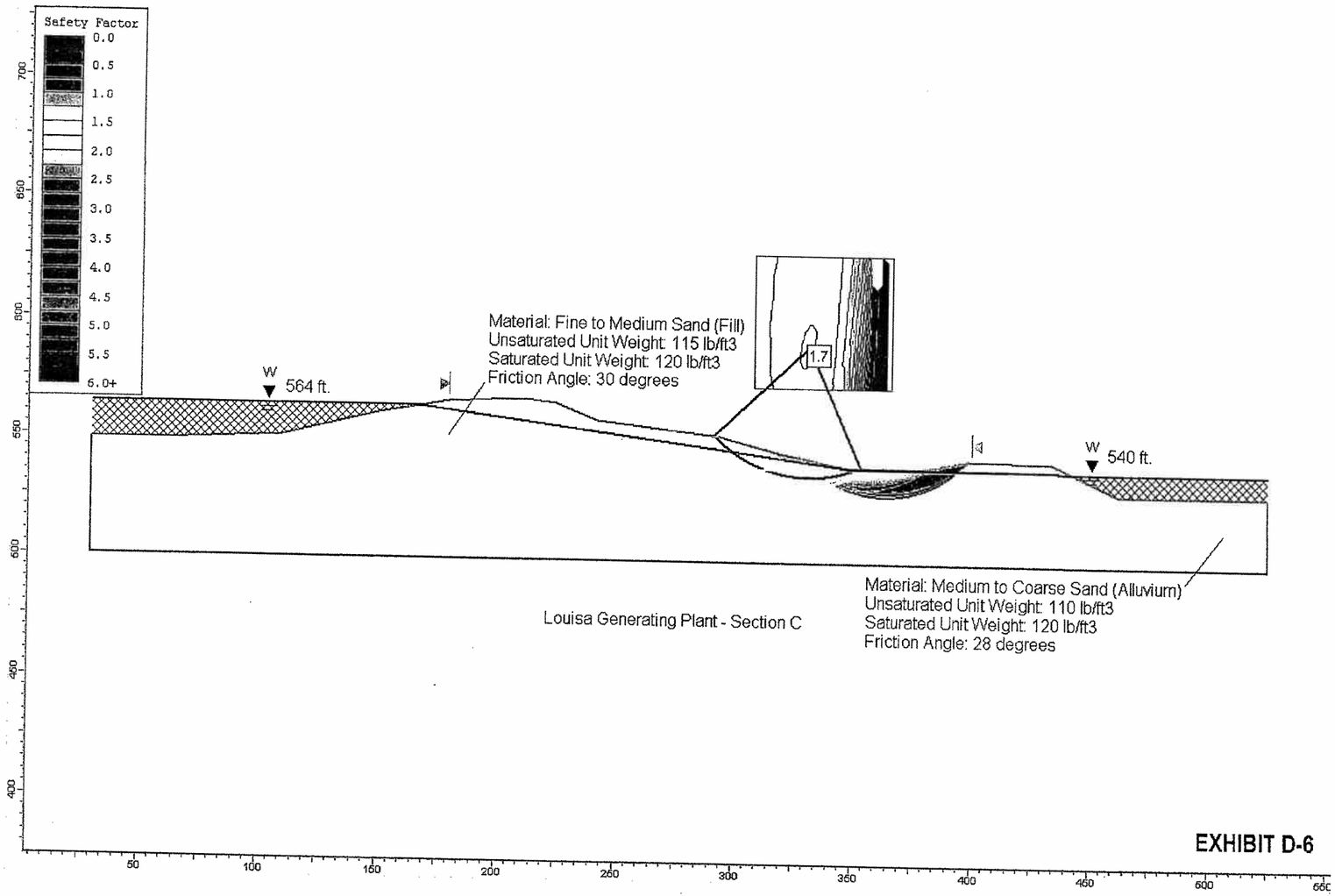

Safety Factor
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
4.5
5.0
5.5
6.0+
W
564 ft.
Material: Fine to Medium Sand (Fill)
Unsaturated Unit Weight: 115 lb/ft3
Saturated Unit Weight: 120 lb/ft3
Friction Angle: 30 degrees
1.7
W
540 ft.
Material: Medium to Coarse Sand (Alluvium)
Unsaturated Unit Weight: 110 lb/ft3
Saturated Unit Weight: 120 lb/ft3
Friction Angle: 28 degrees
Louisa Generating Plant - Section C
700
650
600
550
500
450
400
50
100
150
200
250
300
350
400
450
500
550

EXHIBIT D-6

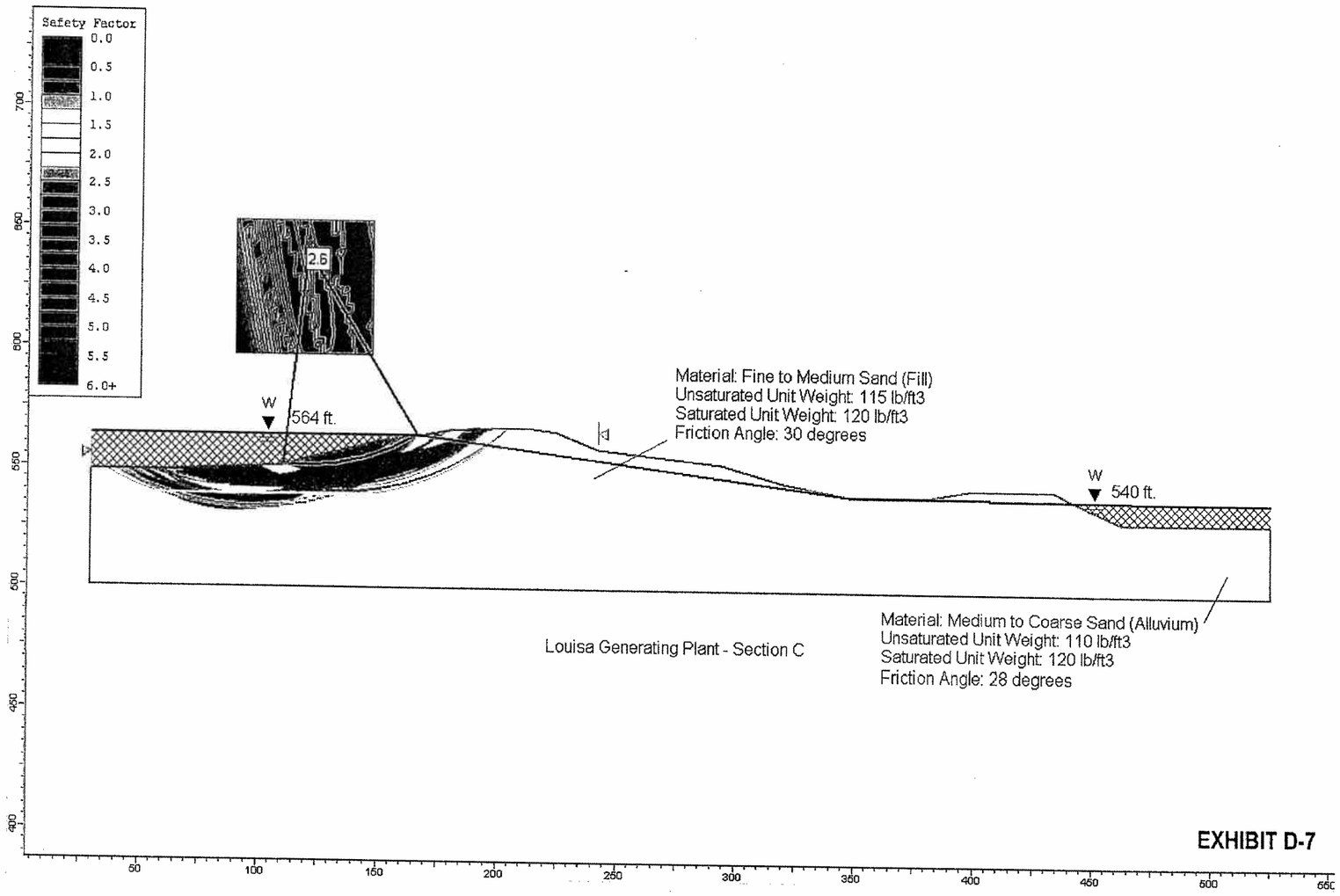

Safety Factor
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
4.5
5.0
5.5
6.0+
2.6
W
564 ft.
Material: Fine to Medium Sand (Fill)
Unsaturated Unit Weight: 115 lb/ft3
Saturated Unit Weight: 120 lb/ft3
Friction Angle: 30 degrees
W
540 ft.
Material: Medium to Coarse Sand (Alluvium)
Unsaturated Unit Weight: 110 lb/ft3
Saturated Unit Weight: 120 lb/ft3
Friction Angle: 28 degrees
Louisa Generating Plant - Section C
700
650
600
550
500
450
400
50
100
150
200
250
300
350
400
450
500

EXHIBIT D-7

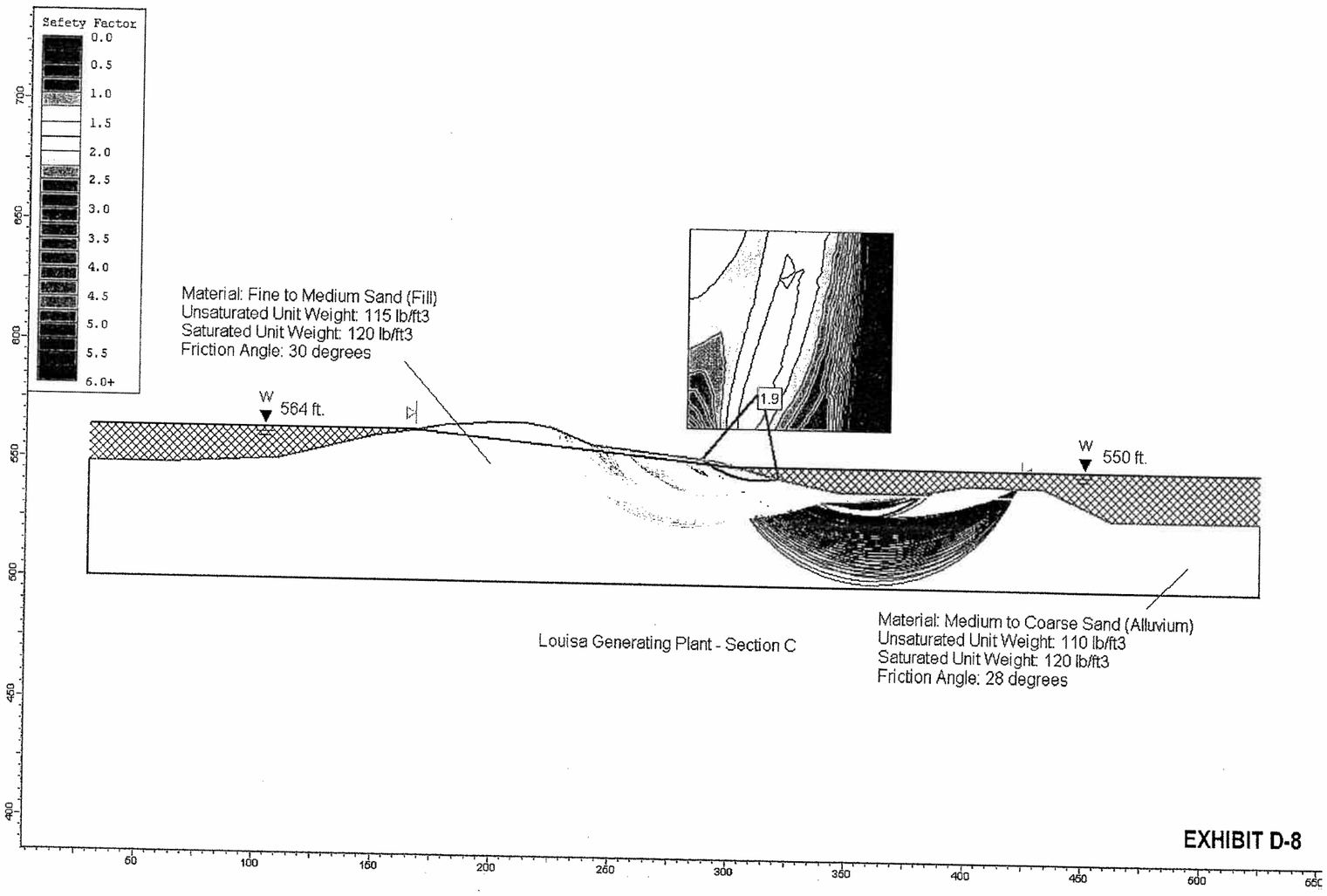
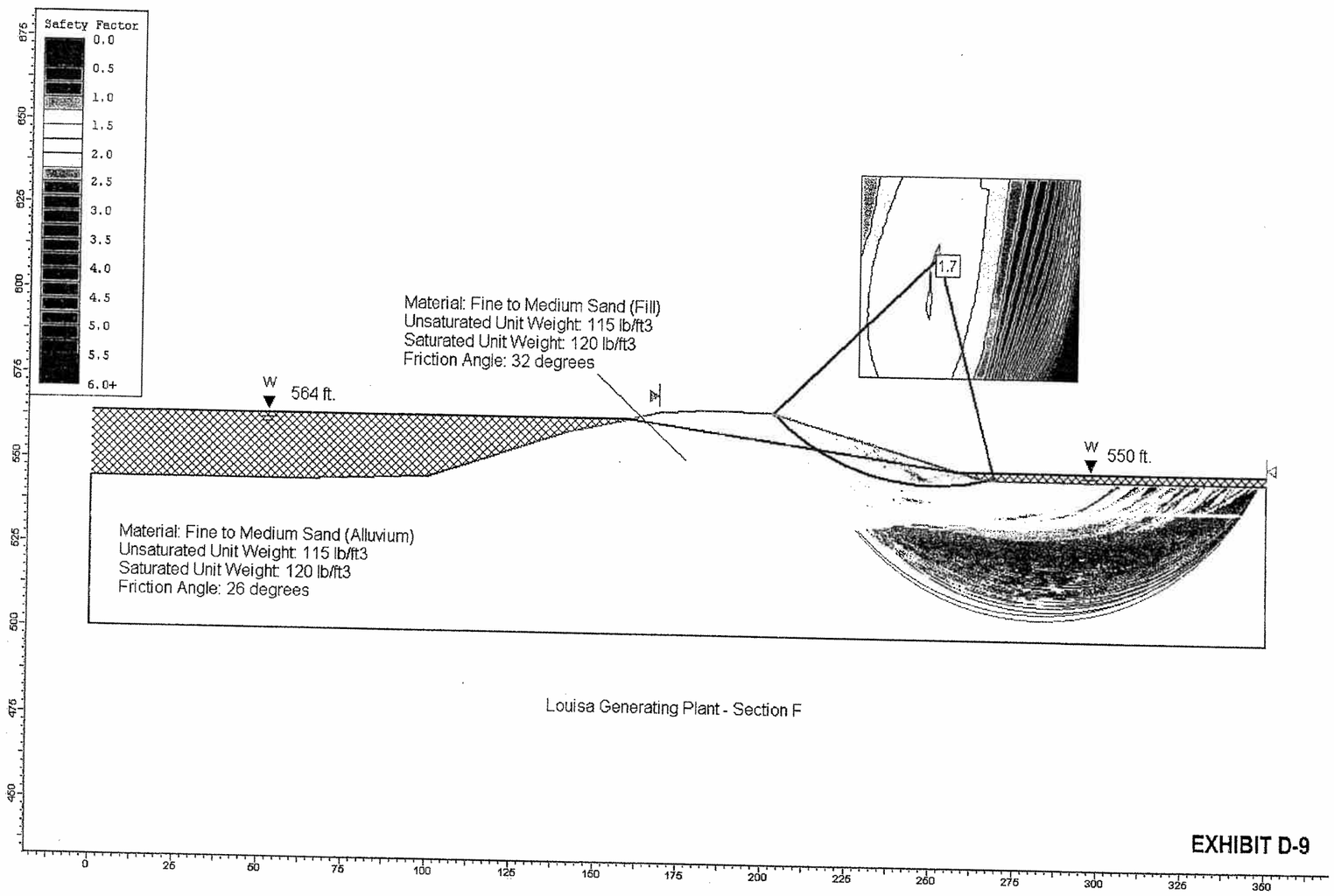
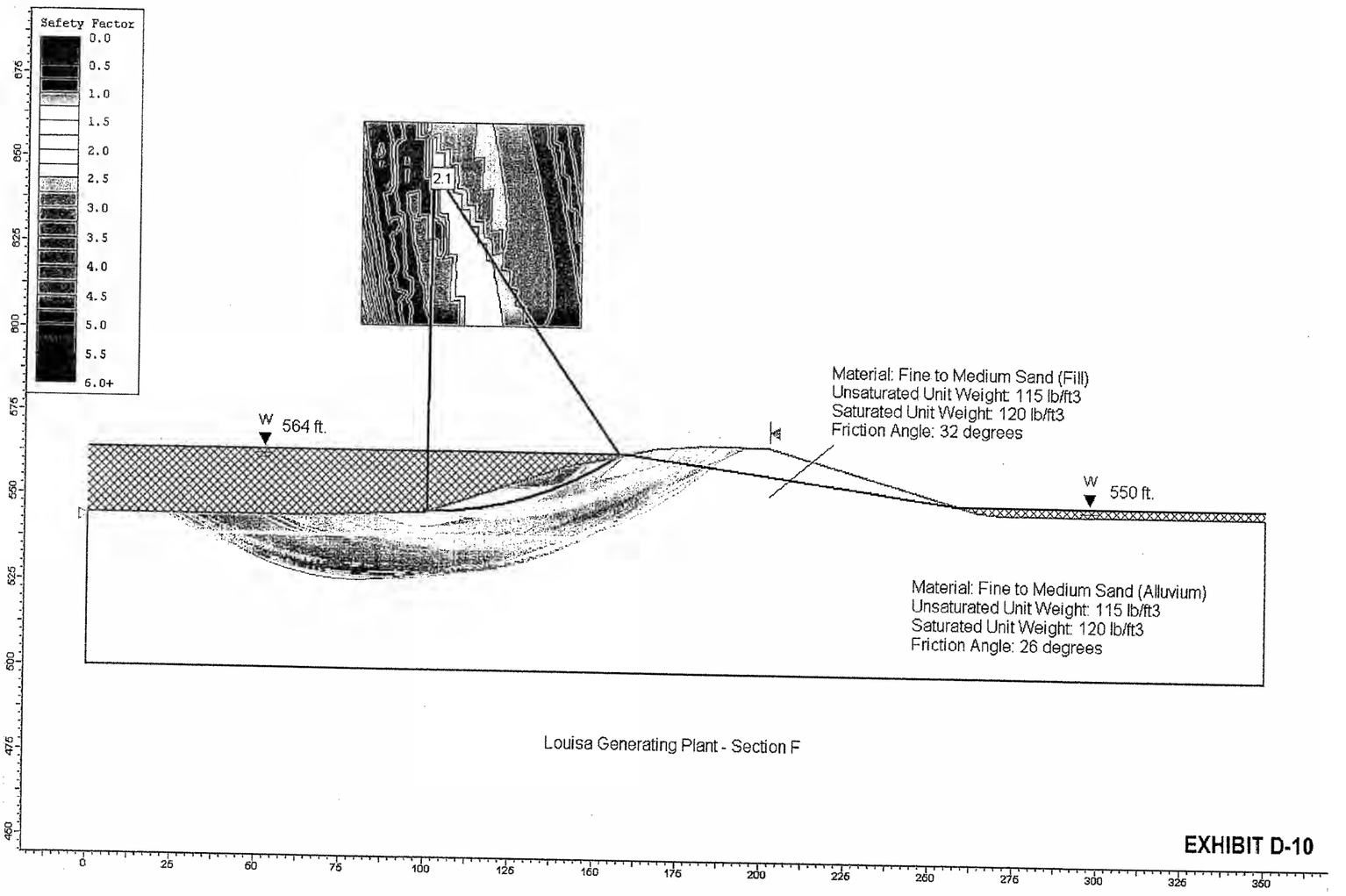

Safety Factor
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
4.5
5.0
5.5
6.0+
Material: Fine to Medium Sand (Fill)
Unsaturated Unit Weight: 115 lb/ft3
Saturated Unit Weight: 120 lb/ft3
Friction Angle: 30 degrees
W 564 ft.
1.9
W 550 ft.
Material: Medium to Coarse Sand (Alluvium)
Unsaturated Unit Weight: 110 lb/ft3
Saturated Unit Weight: 120 lb/ft3
Friction Angle: 28 degrees
Louisa Generating Plant - Section C

EXHIBIT D-8



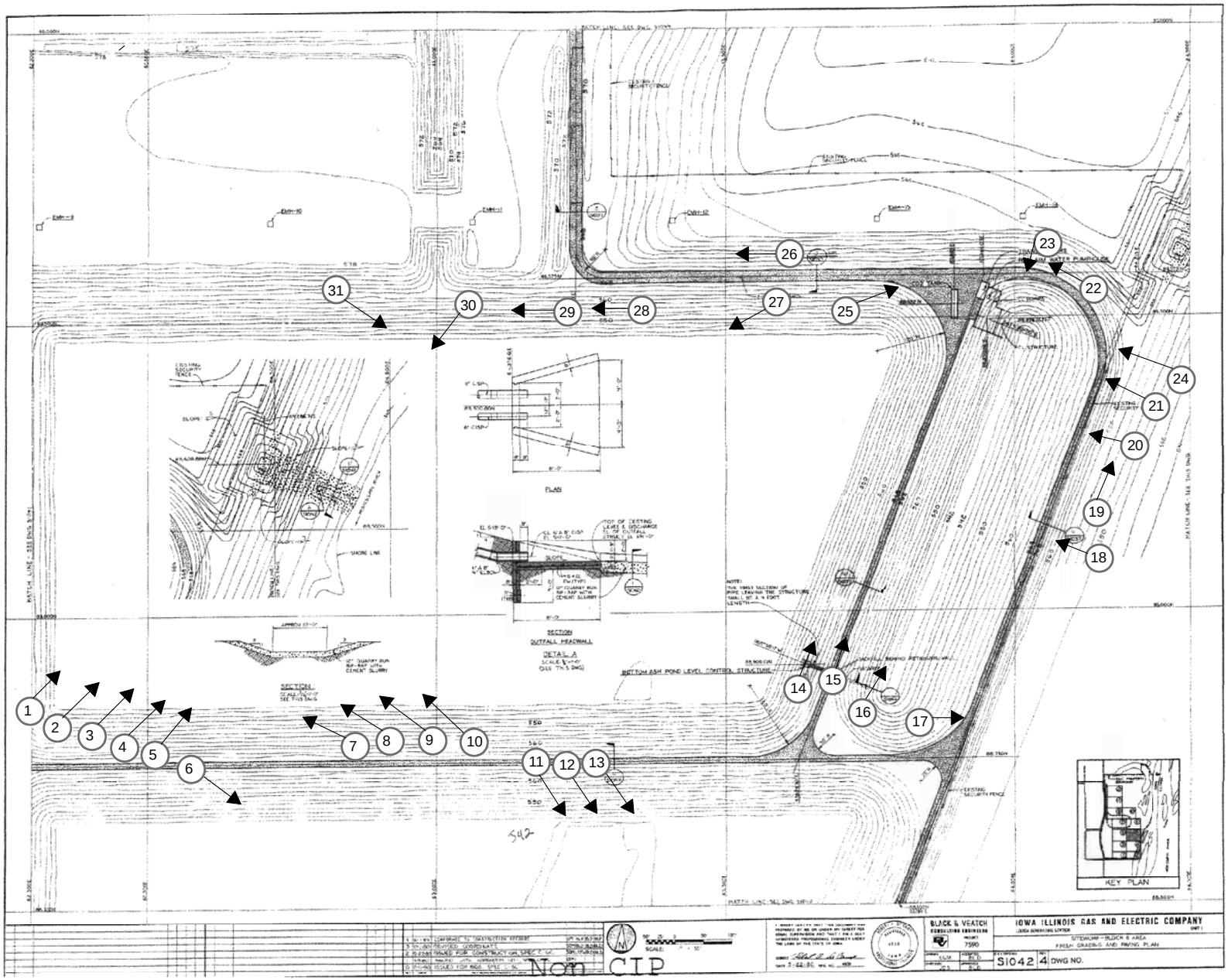
Louisa Generating Plant - Section F

EXHIBIT D-9



Louisa Generating Plant - Section F

EXHIBIT D-10



Louisa Bottom Ash Pond - Photo Log
September 15, 2010


570
566

Coal Combustion Dam Inspection Checklist Form

US Environmental Protection Agency

Site Name: LOUISA GENERATING STATION Date: 15 SEPT 2010

Unit Name: BOTTOM ASH POND Operator's Name: Mid American

Unit I.D.: Hazard Potential Classification: High Significant (Low)

Inspector's Name: Frederic Shmurak & Michael McLaren

Check the appropriate box below. Provide comments when appropriate. If not applicable or not available, record "N/A". Any unusual conditions or construction practices that should be noted in the comments section. For large diked embankments, separate checklists may be used for different embankment areas. If separate forms are used, identify approximate area that the form applies to in comments.

	Yes	No		Yes	No
1. Frequency of Company's Dam Inspections?	MONTHLY		18. Sloughing or bulging on slopes?		✓
2. Pool elevation (operator records)?	561		19. Major erosion or slope deterioration?		✓
3. Decant inlet elevation (operator records)?	N/A		20. Decant Pipes:		
4. Open channel spillway elevation (operator records)?	N/A		Is water entering inlet, but not exiting outlet?		N/A
5. Lowest dam crest elevation (operator records)?	568		Is water exiting outlet, but not entering inlet?		N/A
6. If instrumentation is present, are readings recorded (operator records)?		N/A	Is water exiting outlet flowing clear?		N/A
7. Is the embankment currently under construction?		✓	21. Seepage (specify location, if seepage carries fines, and approximate seepage rate below):		
8. Foundation preparation (remove vegetation,stumps, topsoil in area where embankment fill will be placed)?		N/A	From underdrain?		N/A
9. Trees growing on embankment? (If so, indicate largest diameter below)	✓		At isolated points on embankment slopes?		✓
10. Cracks or scarps on crest?		✓	At natural hillside in the embankment area?		✓
11. Is there significant settlement along the crest?		✓	Over widespread areas?		✓
12. Are decant trashracks clear and in place?		N/A	From downstream foundation area?		✓
13. Depressions or sinkholes in tailings surface or whirlpool in the pool area?		✓	"Boils" beneath stream or ponded water?		✓
14. Clogged spillways, groin or diversion ditches?		✓	Around the outside of the decant pipe?		✓
15. Are spillway or ditch linings deteriorated?		✓	22. Surface movements in valley bottom or on hillside?		✓
16. Are outlets of decant or underdrains blocked?		✓	23. Water against downstream toe?		✓
17. Cracks or scarps on slopes?		✓	24. Were Photos taken during the dam inspection?	✓	

Major adverse changes in these items could cause instability and should be reported for further evaluation. Adverse conditions noted in these items should normally be described (extent, location, volume, etc.) in the space below and on the back of this sheet.

Inspection Issue #	Comments
9.	EXISTING TREES & RECENTLY CUT TREES < 12" Ø; SOME BRUSH
19.	MINOR RILL EROSION (ALONG NORTH D/S SLOPE)

U. S. Environmental Protection Agency

Coal Combustion Waste (CCW)
Impoundment Inspection

Impoundment NPDES Permit # IA 0063282 INSPECTOR Dewberry
Date 15 SEPT 2010

Impoundment Name BOTTOM ASH POND
Impoundment Company Mid American
EPA Region VII
State Agency (Field Office) Addresss _____

Name of Impoundment _____
(Report each impoundment on a separate form under the same Impoundment NPDES Permit number)

New _____ Update _____

	Yes	No
Is impoundment currently under construction?	_____	✓
Is water or ccw currently being pumped into the impoundment?	✓	_____

IMPOUNDMENT FUNCTION: COAL CONTAINMENT WASTE - BOTTOM ASH DEPOSITION & STORAGE

Nearest Downstream Town : Name BURLINGTON IA
Distance from the impoundment ~ 50 Miles
Impoundment
Location: Longitude 90 Degrees 48 Minutes 58 Seconds
Latitude 41 Degrees 28 Minutes 50 Seconds
State IA County LOUISA

Does a state agency regulate this impoundment? YES _____ NO ✓

If So Which State Agency? _____

HAZARD POTENTIAL (In the event the impoundment should fail, the following would occur):

_____ **LESS THAN LOW HAZARD POTENTIAL:** Failure or misoperation of the dam results in no probable loss of human life or economic or environmental losses.

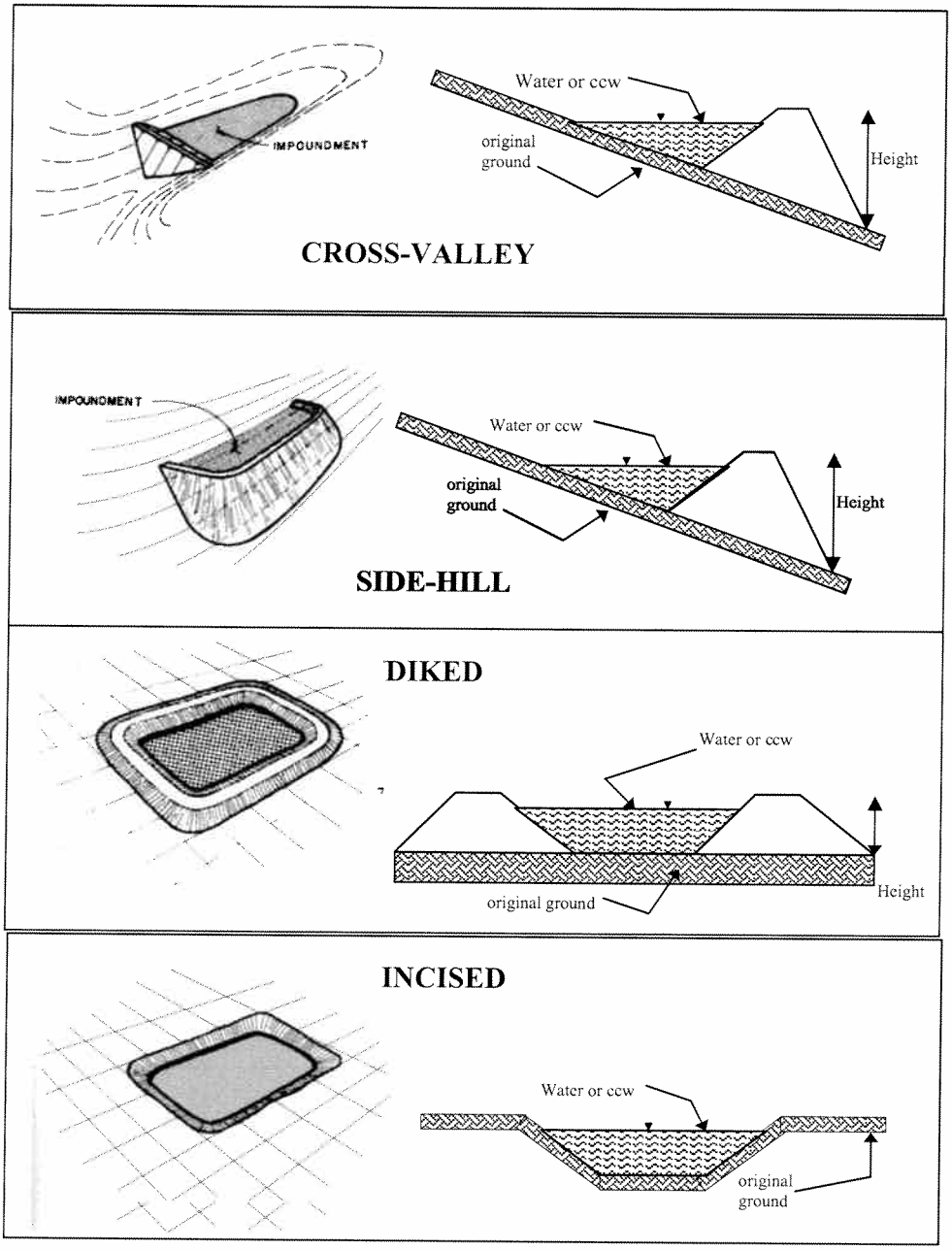
__✓__ **LOW HAZARD POTENTIAL:** Dams assigned the low hazard potential classification are those where failure or misoperation results in no probable loss of human life and low economic and/or environmental losses. Losses are principally limited to the owner's property.

_____ **SIGNIFICANT HAZARD POTENTIAL:** Dams assigned the significant hazard potential classification are those dams where failure or misoperation results in no probable loss of human life but can cause economic loss, environmental damage, disruption of lifeline facilities, or can impact other concerns. Significant hazard potential classification dams are often located in predominantly rural or agricultural areas but could be located in areas with population and significant infrastructure.

_____ **HIGH HAZARD POTENTIAL:** Dams assigned the high hazard potential classification are those where failure or misoperation will probably cause loss of human life.

DESCRIBE REASONING FOR HAZARD RATING CHOSEN:

CONFIGURATION:



_____ Cross-Valley
_____ Side-Hill
_____ Diked
_____ Incised (form completion optional)
__✓__ Combination Incised/Diked

Embankment Height 26 feet
Pool Area 42 acres
Current Freeboard 7 feet

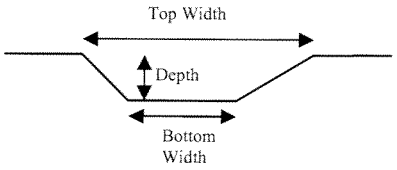
Embankment Material SAND
Liner CLAY (12")
Liner Permeability 3×10^{-7} cm/s

TYPE OF OUTLET (Mark all that apply)

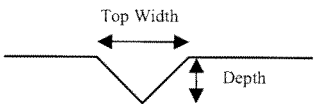
_____ **Open Channel Spillway**
_____ Trapezoidal
_____ Triangular
_____ Rectangular
_____ Irregular

_____ depth
_____ bottom (or average) width
_____ top width
_____

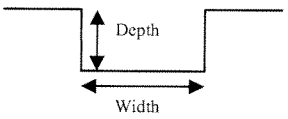
TRAPEZOIDAL



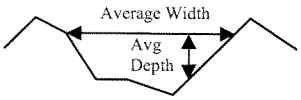
TRIANGULAR



RECTANGULAR

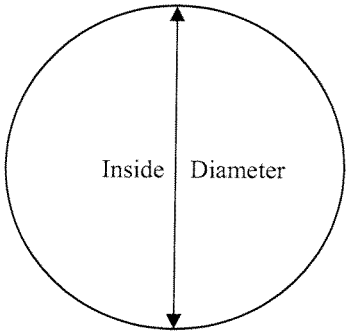


IRREGULAR



_____ **Outlet**

_____ inside diameter



Material
_____ corrugated metal
_____ welded steel
_____ concrete
_____ plastic (hdpe, pvc, etc.)
_____ other (specify) _____

_____

Is water flowing through the outlet? YES _____ NO _____

_____ **No Outlet**

_____

✓ **Other Type of Outlet** (specify) 6"Ø welded steel Pressure Line

The Impoundment was Designed By Black & Veatch

Has there ever been a failure at this site? YES _____ NO ✓

If So When? _____

If So Please Describe : _____

Has there ever been significant seepages at this site? YES _____ NO ✓

If So When? _____

IF So Please Describe: _____

Has there ever been any measures undertaken to monitor/lower Phreatic water table levels based on past seepages or breaches at this site? YES _____ NO ✓

If so, which method (e.g., piezometers, gw pumping,...)? _____

If so Please Describe : _____